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Gas Content of Gladys McCall Reservoir Brine

A Topical Report

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Executive Summary

On October 8, 1983, after the first full day of production from Sand #8 in the Gladys McCall well, samples of separator gas and separator brine were collected for laboratory P-V-T (pressure, volume, temperature) studies. Recombination of amounts of these samples based upon measured rates at the time of sample collection, and at reservoir temperature (290 Deg. F.), revealed a bubble point pressure of 9200 psia. This is substantially below the reported reservoir pressure of 12,783 psia. The gas content of the recombined fluids was 30.19 SCF of dry gas/STB of brine. In contrast, laboratory studies indicate that 35.84 SCF of pure methane would dissolve in each STB of 95,000 mg/l sodium chloride brine. These results indicate that the reservoir brine was not saturated with natural gas.

By early April, 1987, production of roughly 25 million barrels of brine had reduced calculated flowing bottomhole pressure to about 8600 psia at a brine rate of 22,000 STB/D. If the skin factor (s) were as high as 20, flowing pressure drop across the skin would still be only about 500 psi. Thus, some portion of the reservoir volume was believed to have been drawn down to below the bubble point deduced from the laboratory recombination of separator samples.

When the pressure in a geopressured geothermal reservoir is reduced to below the bubble point pressure for solution gas, gas is exsolved from the brine flowing through the pores in the reservoir rock. This exsolved gas is trapped in the reservoir until the fractional gas saturation of pore volume becomes large enough for gas flow to commence through a continuous gas-filled channel. At the same time, the gas/brine ratio becomes smaller and the chemistry of the remaining solution gas changes for the brine from which gas is exsolved.

A careful search was made for the changes in gas/brine ratio or solution gas chemistry that would accompany pressure dropping below the bubble point pressure. Changes of about the same magnitude as the scatter in the data appear to have occurred in mid-1985 when calculated flowing bottomhole pressure was in the range of 9400 to 9700 psi.

After the amount of brine flowing through rock near to the wellbore has exsolved enough gas for onset of gas mobility through a continuous gas-filled channel, another test for whether the reservoir is below its bubble point becomes possible. This "bubble test" consists of suddenly increasing flow rate so that bottomhole pressure drops. Gas expansion then results in a small portion of the free gas from near the wellbore being produced in a short period of time. The resulting "bubble" of gas has a higher natural gas liquids content than gas produced before and after the transient.

"Bubble tests" were performed in February 1986 and April 1987. Neither test liberated enough additional gas to provide a detectable change in produced gas/brine ratio. However, observed small transients in Ethane/Methane and Propane/Methane ratios indicate that some free gas was produced from the near wellbore region. These results suggest that the bubble point pressure must have been in the vicinity of the calculated 9500 psi flowing bottomhole pressure during the second half of 1985.

We conclude that:

- Sand #8 in the Gladys McCall well was NOT saturated with natural gas at the reported initial reservoir pressure of 12,873 psia.
- Flowing bottomhole pressure became less than the bubble point pressure during 1985.
- Bubble point pressure was in the range of 9200 to 10,000 psi.

It is noted that a large increase in Barium content, as well as smaller changes in concentrations of other dissolved species, were observed at about the same time that near wellbore flowing pressure fell below the bubble point pressure. If these changes signalled arrival of brine from a different reservoir compartment, that brine was also undersaturated with natural gas at the initial reservoir pressure.

Gas Content of Gladys McCall Reservoir Brine

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Gas Content of Gladys McCall Reservoir Brine

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This report addresses two aspects of gas production from Sand #8. The first is the rate and composition of the produced gas. The second is whether or not the aquifer is saturated with natural gas.

These topics were previously addressed for this sand by other authors after only a few million barrels of brine had been produced and when drawdown of the reservoir was less than 1000 psi. The basic question for this report is whether data from production of roughly 25 million barrels of brine and drawdown of about 4000 psi make appropriate revisions to prior conclusions.

After about 24 hours of production at 13,400 BPD, separator gas and brine samples were collected at a pressure of 500 psi for laboratory P-V-T (pressure, volume, temperature) analyses on October 8, 1983. The laboratory analysis report is provided herewith as Appendix A. Note that recombination of the sampled fluid phases in a ratio defined by flow rate data resulted in a bubble point pressure of 9200 psia whereas the initial reservoir pressure had been reported to be 12,783 psia.

This laboratory result from sampling at the beginning of testing of sand #8 was the basis for Mr. Larry Durrett reporting in January 10, 1984 that "---, in fact, this reservoir is slightly undersaturated with respect to natural gas. If you extrapolate the curve out to the reservoir pressure, which is slightly less than 13,000 pounds, it shows that its (sic) about 80% saturated" (MINUTES FROM - DOE/INDUSTRY GEOPRESSURE GEOTHERMAL RESOURCE DEVELOPMENT PROGRAM WORKING GROUP MEETINGS, CK GeoEnergy Corporation, DOE/H&N/CKG/3-84). In his paper in the Proceedings of the Sixth U.S. Gulf Coast Geopressured-Geothermal Energy Conference, Austin TX, February 4-6, 1985, Mr. Don Clark similarly stated "The reservoir fluid appears to be undersaturated with natural hydrocarbon gases of about 31.6 cubic feet of dry gas per standard barrel of brine".

Revisiting the question of gas content of brine is particularly important because (1) coning of free gas into the wellbore with continuing drawdown would dramatically improve the economics of production and (2) the early flow testing of the well involved serious problems in obtaining and interpreting gas production rate data. Indeed, calculated gas rates at the times of sampling are the only reported rates that we have been able to find for the 21 day test of Sand #8 during October and November of 1983. This raises the question as to whether the recombination bubble point of 9200 psia is in error due to error in the rate data that was the basis for selecting the quantities of gas and brine to recombine in the laboratory.

1.0 GAS PRODUCTION, MEASUREMENT, AND ANALYSES

The gas separation and metering at the Gladys McCall site is represented schematically in Exhibit 1.1. There are two separators operating in series. Gas and brine are separated in the first separator at pressures that are usually around the sales line pressure of 1000 psig. The brine then passes to the second, low pressure, separator where some additional gas liberated by the pressure drop is recovered. Gas remaining in the brine after the low pressure separator is put down the disposal well.

The operating pressure of the low pressure separator is governed by two criteria. First, the pressure must be high enough to inject the brine into the disposal well. There are no pumps to push the brine down the disposal well. The second criterion is the gas buyer's requirement that the carbon dioxide content of the comingled high pressure and compressed low pressure gas must be less than ten percent. Lowering the pressure in the low pressure separator increases the total recovery of hydrocarbons but also increases the carbon dioxide content of the comingled sales gas.

1.1 Gas Analyses

Numerous gas samples have been collected and analysed over the years. The composition of the gas at every sample point depends on the pressure and temperature at that point as well as the fluids previously removed

Exhibit 1.1 Gladys McCall Gas Separation Schematic

from the gas stream. Appendix B contains results of all gas analyses that we have found. They are grouped by sample locations chosen to facilitate data interpretation for various purposes. The analyses reported have been performed by IGT, Weatherly Laboratories, or Petroleum Analyst, Inc. The latter laboratory analyses samples for the gas buyer (Louisiana Resources, Inc.). The natural gas liquids content, gravity, and heating value for all samples have been recalculated on a common basis since factors used by different laboratories are often not consistent. Note that heating value is tabulated for a base pressure of 14.73 psia whereas the natural gas liquids are reported on the Louisiana pressure base of 15.025 psia.

Each sample location is identified by a number and a code word. In Exhibit 1.1 the sample locations are numbered. These numbers are also on the tables in Appendix B. Each sample location is discussed below.

- Choice 1, identified as GMITOPGAS, is gas obtained from the top of the first stage separator. This gas is sampled at the first stage separator pressure and brine temperature. This gas is at equilibrium with the brine. This gas is most representative of what is being produced at a given moment from the well, because most of the gas produced is first available at that sample point.

- Choice 2, identified as GM1KELYGAS, is gas obtained from the gas line out of the first stage separator before the cooler. This gas differs from Choice 1 in that some cooling of the gas and associated condensation of water and natural gas liquids occurs as the gas moves from the high pressure separator to the sample collection point. This location is where Keeley and Meriwether (USWL) collect "cryocondensate" samples from the gas stream.

- Choice 4, identified as GM1METRGAS, is gas obtained from a valve on the side of the first stage separator gas to sales orifice meter. Analyses of this gas should be used in the flowrate calculations for that orifice. This gas has been cooled to near ambient temperature and the resultant liquids have been removed. Gas samples obtained from the high pressure separator H2S sample point are indistinguishable from gas obtained at the meter run.

- Choice 5, identified as GM1FLSGGAS, is actually obtained by collecting brine from the first stage separator before the dump valves. The brine is collected at the first stage separator pressure and temperature in steel cylinders. The brine is cooled and the pressure reduced to atmospheric. Gas exsolves from the brine. In normal operations, a portion of this gas would be recovered by the second stage separator and a portion injected with the brine down the disposal well.

- Choice 7, identified as GM2DRAGAS, is gas obtained at the second stage separator gas to sales orifice meter. This gas is at the second stage pressure and at a temperature usually near that of the brine. Analyses of this gas should be used in the flowrate calculations for that orifice. Gas samples obtained at the low pressure separator H2S sample point are similar to gas obtained at the orifice plate.

- Choice 8, identified as GM2FLSHGAS, is gas flashed from brine collected at the second stage separator temperature and pressure. This gas is normally injected down the disposal well.

- Choice 9, identified as GMSALEGAS, is gas obtained after the first and second stage gas has been brought to sales line pressure, cooled, and had the water removed with a glycol unit. The sample location is near the sales gas orifice meter.

- Choice 10, identified as GM_LLA_SALE, is gas obtained at the custody transfer point near the road, roughly 2.4 miles from the Gladys McCall location. This gas is similar to Choice 9, but analyses of samples from this point by the buyer, Louisiana Resources Inc, are used for custody transfer considerations. These include verification that the gas meets contract specifications (such as water content, H2S content and less than 10% carbon dioxide) and determination of BTU content.

1.2 Gas Rate Measurement

The direct measurements of gas production rates from the two separators and the comingled gas to sales are made with orifice meters. Each

separator is equipped with separate orifice plates for gas flow to sales and for gas flow to flare. Portions of gas from each separator could be simultaneously sold and flared. The orifices are not equipped with block valves and bypasses. Thus, shut-in of production would be required for changing orifice plate size. In practice, sensitivity is adjusted by changing the span of the differential pressure transmitter, with the inherent degrading of resolution and accuracy for low rates.

The amount and composition of gas in the brine leaving each separator is periodically determined by measuring the amount liberated from a cooled brine sample when the pressure is reduced to atmospheric and analysis of that gas. The carbon dioxide content of recovered gas and of gas in brine sent to the disposal well is dependent upon whether scaling occurs. The formation of each molecule of carbonate scale is accompanied by formation of a carbon dioxide molecule.

1.2.1 Orifice Metering

The gas production rates reported from the Gladys McCall location are calculated by the operators with the use of a table for each meter run that is a function only of pressure and temperature. Multiplying the value obtained by interpolation of the table by the square root of the differential pressure then yields the reported gas rate. These tables were provided by a consultant during 1984. Notations on the tables reveal that the following values were used to calculate them:

	H P Sep	L P Sep	Sales
Dimensions:			
Pipe I.D., in.	2.626	2.626	2.067
Orifice bore, in.	.75	.375	.625
Gas Properties:			
Molecular weight	18.957	22.832	19.407
Specific heat ratio	1.3	1.3	1.3
Viscosity, cp.	.015	.015	.015
Dry Gas Gravity (ideal) calculated from the above molecular weight	.6545	.7883	.6701

This field procedure assumes that the only variables in the orifice equation for each meter run are the measured pressure, differential pressure and temperature. But, in practice, the orifice equation has multiplicative factors that are dependent upon the composition of the gas being metered. The most significant is the gas gravity factor, which is the inverse of the square root of the gas gravity. A smaller composition dependence is in the supercompressibility factor (inverse of the square root of the compressibility or z) for deviation from ideal gas behavior.

Correction of metered gas rates for water vapor is very significant for the meter runs on the low pressure separator. At a temperature of 260 degrees Fahrenheit, the vapor pressure of water is 35.4 psia. Thus, at a separator pressure of 400 psia, roughly 9 percent of the gas passing through the orifice plate is water vapor which is condensed and removed from the stream before the gas is sold. The effect of this water vapor upon gas gravity and supercompressibility should be taken into account in deducing total gas flow rate from the orifice meter and then correction should be made for the water to be condensed.

When IGT installed the computer data acquisition system on the Gladys McCall site in 1986, the real, dry gas gravities selected in an effort to match operator reported rates were 0.6562, 0.727 and 0.670 for the high pressure separator, low pressure separator and sales gas meter runs respectively. Resolution of differences of up a few percent between operator reported rates and rates from the digital system was not practicable due to lack of details on the calculations that produced the tables used by the operators.

The actual dry gas gravity depends primarily on the pressure of the separators. The higher the separator pressure, the lower the gas gravity. This function is clearly shown in Exhibits 1.2 and 1.3, which presents the gas gravity calculated from analyses of gas samples collected at the orifice meters on the high and low pressure separators (choices 4 & 7) at various times over the life of the test. The dry gas gravity will also be affected by the brine temperature and, for the low pressure separator, by the operating pressure of the high pressure separator.

Exhibit 1.2 First Stage Separator Gas Gravity vs. Pressure

Exhibit 1.3 Second Stage Separator Gas Gravity vs. Pressure

On April 13-14, 1987, when the high pressure separator was at 515 psia and the low pressure separator was at 400-450 psia, low pressure separator gas gravity was lower than would be expected at that pressure. These data points are blackened in Exhibit 1.3 to differentiate them from the remaining samples. The extent to which the lower gravities are due to undocumented transfers of gas from the high pressure separator to the low pressure separator through a bypass line is not clear. These transfers were needed to maintain control of the level in the low pressure separator.

With the actual gas gravities differing from the assumed gas gravity, the calculated gas flow rates will be in error. The gravities are correct only if the high pressure separator is operated at 1000 psia and the low pressure separator is kept at 420 psia. Exhibit 1.4 shows the error in the reported gas rates at several operating pressures.

Exhibit 1.4, Error in Gas Rate Calculations Based on
The Different Gas Gravities at Various Pressures

Pressure	Gas Gravity	Error in Calculated Gas Rate
High Pressure Separator		
500 psia	0.683	2.0 % high
750 psia	0.669	1.0 % high
1015 psia	0.656	0.0
Low Pressure Separator (HP Sep @ 1000 psi)		
300 psia	0.775	3.2 % high
400 psia	0.732	0.3 % high
500 psia	0.708	(-1.3)% low

1.2.2 Gas in Brine

IGT uses an algorithm based on those of Garg and Blount to calculate the amount of gas remaining in the brine after the separator. The validity of this algorithm has been demonstrated on numerous DOE wells. Exhibit 1.5 presents the amount of gas recovered during brine flashes performed by IGT and Weatherly on brine from both the first and second stage separators versus the separator pressure. The amount of gas left in the brine is

GAS FLASHED AT ROOM CONDITIONS (SCF/STB)

Exhibit 1.5 Gas Left in Brine vs. Separator Pressure

dependent on the pressure of the separator. The temperature would also have a much smaller effect on gas content, but the Gladys McCall system has remained relatively isothermal.

The diamonds in Exhibit 1.5 are gas liberated by reducing the pressure on separator brine to atmospheric pressure (flashing) by IGT and Weatherly. The "X"s represent calculated values which are low by about 30%. Recall that the algorithm is based on methane solubility in brine.

Exhibit 1.6 presents the METHANE content of the separator brine versus the METHANE PARTIAL PRESSURE in the separator. The "X"s are the same as in Exhibit 1.5, representing the IGT algorithm for calculating gas content in brine after the separator. The agreement between the two is excellent. Methane content of brine after the separator is consistent with Henry's Law in that it deviates little from a linear dependence. For every 100 psi of methane partial pressure, 0.56 SCF/STB of methane will remain in the brine. This compares to values of 0.62 SCF/STB/100 psi for the Wainoco P.R. Girouard #1, 0.60 SCF/STB/100 psi for the Pleasant Bayou #2, and 0.53 SCF/STB/100 psi for the HO&M Prairie Canal #1.

Exhibit 1.7 is a plot of ethane content of disposal brine versus the ethane partial pressure in the separator. Again, there is a simple linear relationship that follows Henry's Law, with 0.0040 SCF ethane/STB/psi, which compares favorably with 0.0038 SCF ethane/STB/psi ethane partial pressure at the HO&M Prairie Canal #1 Well. Note that these values are valid ONLY FOR METHANE AND ETHANE PARTIAL PRESSURES, not separator pressure.

These simple relationships, which do not change with flowrate, indicate that the separators are at equilibrium and the only way to recover more methane is lower the separator pressure.

1.3 Gas Production and Gas/Brine Ratios

MONTHLY PRODUCTION REPORTS have been produced in the field in a consistent manner since the start of testing of the Gladys McCall well. Daily production and pressures are summarized on a single line on each of

METHANE FLASHED AT ROOM CONDITIONS (SCF/STB)

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Exhibit 1.6 Methane Left in Brine vs. Methane Partial Pressure in the Separator

Exhibit 1.7 Ethane Left in Brine vs. Ethane Partial Pressure in the Separator

the two pages of the monthly report. IGT has entered these data into a computer and augmented the data by using our algorithms to convert brine rate to stock tank barrels per day (STB), to calculate gas content of brine to the disposal well, and to calculate flowing bottomhole pressure.

First, IGT calculates a brine rate in terms of stock tank barrels of brine per day (STB/D) from the reported separator barrels per day. Operator reported gas production rates are not adjusted for gas gravity or changed in any manner. Next, the computer calculates the amount of gas remaining in the brine after the second separator. By adding the gas recovered in the first separator, the gas recovered in the second separator, and the gas remaining in the brine after the second separator, all of the gas produced from the reservoir is accounted for. The result of this calculation procedure is called the perforation gas.

Cumulative perforation gas production versus cumulative brine production from these calculations is presented in Exhibit 1.8. The overall gas to brine ratio taken from the slope of the line is 28.8 SCF/STB.

1.4 Total Gas Measurement

The partitioning of gas between separator meter runs and brine to the disposal well is dependent upon separator pressures. Thus, deducing whether the gas content of each barrel of brine passing through the perforations into the wellbore has changed with time requires summing of two or three gas volume and composition measurements to deduce total gas content of produced brine at each time.

Several analyses are needed to define the total produced gas. The easiest method of determining this value is by measuring the first stage separator gas and the gas remaining in the brine after the first stage separator. In terms of the gas analyses in the Appendix, Choice 1 (or 2 or 4) with Choice 5. An equally acceptable alternative is to replace Choice 5 with Choice 7 and Choice 8.

The gas analyses are combined by weighting each by the gas to brine ratio at each sample point. The first stage separator gas generally comprises

**Exhibit 1.8 Cumulative Perforation Gas Production
vs. Cumulative Brine Production**

23 SCF/STB out of a total of 29 SCF/STB, so the composition of the first stage gas greatly effects the composition of the total gas. In contrast, a flash of the second stage separator brine generally provides less than 3 SCF/STB. So even though the composition of this flashed gas is very different than that of the first stage gas, it does not overly affect the calculated composition of the total gas.

In more detail, for each sample point, the procedure is to multiply the mole fractions of each gaseous species by the appropriate gas to brine ratio. This will result in cubic feet of methane, ethane, propane, etc. per barrel of brine. Then, the contributions from sample points are added until all of the produced gas is counted, as described above. Finally, the gas/brine ratio for each gas component is divided by the sum of all gas to brine ratios to get the composition of the total gas.

A compilation of all total gas measurements made to date are provided in Appendix C. In cases where the first stage separator brine was flashed, the second stage separator gas is not needed to calculate the total gas, and -.10 is inserted in the gas composition table to differentiate no analysis from a measured zero concentration.

2.0 GAS CONTENT OF RESERVOIR BRINE

If a geopressured geothermal reservoir is not saturated with gas, the possibility of economically viable production has not been established. Conversely, if the reservoir is saturated with gas, there is a distinct possibility that free hydrocarbons exist somewhere in the reservoir. If these free hydrocarbons cone into the well, such as occurred on the Lear G.M. Koelemay #1 well, the production economics improve dramatically.

Laboratory recombination of samples of separator gas and brine that were collected October 8, 1983, after only a day of production from sand #8, gave a bubble point of 9200 psia. This is much less than the initial reservoir pressure of 12,783 psia and indicated that the reservoir brine was not saturated with natural gas. The primary uncertainty in this conclusion was whether rate measurement problems had resulted in laboratory recombination of the wrong gas/brine ratio.

The data from long term testing makes possible use of several other tests and analytical techniques to address the question of saturation of reservoir brine. These tests involve both gas to brine ratio measurements and chemical composition measurements. The preponderance of data leads us to conclude that the reservoir was not originally saturated with gas. The reservoir may even now be drawn down to below the bubble point only in the near wellbore area. The data and interpretation leading to these conclusions are discussed in the following sections.

2.1 P-V-T Studies

The 1983 P-V-T study (report is Appendix A) was performed by the same personnel and laboratory facility as similar prior studies of samples from Wells of Opportunity. The prior work had eliminated many "bugs" from the very tricky and tedious procedure and achieved good agreement with other laboratories studying solubility of natural gas in brine.

Exhibit 2.1 presents the the gas to brine ratios from Appendix A in terms of SCF/separator barrel and SCF/STB and the resulting bubble point pressures. The right hand column is methane solubility calculated from equations developed for DOE by C.W. Blount and his students.

Exhibit 2.1, Weatherly P-V-T Recombination Data

---GAS TO BRINE RATIOS---		Bubble point	BLOUNT SOLUBILITY*
SCF/sep. barrel	SCF/STB	(psia)	SCF/STB
10.01	14.36	2855	15.85
15.00	19.64	4550	20.68
18.00	22.82	5785	23.64
20.00	24.94	6730	25.67
25.01	30.25	9200	30.30
31.9 ⁺	37.5	12783	35.84

+ extrapolated

* Calculated for 294 Deg F. and 95,000 ppm NaCl

Due to the hydrostatic pressure of brine in the well, the only entries in Exhibit 2.1 descriptive of credible producing conditions are the three highest pressures. The agreement between recombination gas content and laboratory solubility of pure methane in pure NaCl brine is surprisingly close at bubble point pressures of 6780 and 9200 psia. Unfortunately, page 12 of the P-V-T report in Appendix A reflects the authors questionable extrapolation to 31.9 SCF sep.gas @ 15.025 psia & 60 deg F per BBL sep.water @ 500 psig & 268 deg F. at reservoir pressure that is on page 20 of the report. Correcting to atmospheric pressure and 60 deg F and adding gas flashed from the separator brine results in the high value of 37.5 SCF/STB for gas solubility in reservoir brine. The authors extrapolation on page 23 of the report (to 35.8 SCF/STB) is in excellent agreement with expectations based on pure components.

As previously mentioned, one concern regarding the 1983 P-V-T work is whether an incorrect ratio of separator gas and brine was recombined due to problems or errors in flow rate measurement. The oil accumulation in the separators that became apparent more than a year after the start of production provides another concern. It is virtually impossible to collect and recombine samples of three fluid phases (gas, oil & water) in the correct proportions. Also, careful work in the same laboratory had previously revealed that trace amounts of oil precluded reproducible measurement of the gas/brine bubble point for samples from the Lear G.M. Koelemay well.

2.2 Changes in the Produced Gas to Brine Ratio

Weatherly's P-V-T data suggest that for every psi the brine is below the bubble point, 0.002 SCF/STB of gas will come out of solution. This gas will be trapped in the portion of the cone of depression that is below the bubble point pressure until the critical gas saturation of about 3% of the pore volume is reached. The volume of this portion of the cone of depression will increase with time and only a small portion of the gas being trapped will flow. The produced gas to brine ratio is expected to be reflect the solubility of gas at the pressure that exists with a few feet of the wellbore rather than the gas content of original reservoir brine.

Exhibit 2.2 is a plot of the perforation gas to brine ratios for which daily perforation gas rates have been calculated as set forth in section 1.3 to include an estimate of gas remaining in brine to the disposal well. The difficulty in measuring the gas rates during the first portion of the test is apparent as scatter in values for the gas/brine ratio. By late 1984 the problems had been largely overcome and the data appears good. Whether the drops in the gas to water ratio during the third and fourth quarters of 1985 are due to the bottomhole pressure falling below the bubble point pressure is conjectural but is within the realm of possibility. The first successful inhibitor pill had been pumped. Sustained brine rates were higher than had previously been practicable and flowing bottomhole pressure was correspondingly lower (roughly 9500 psi).

This slight decline made the small change in the slope of the cumulative gas versus cumulative brine plot (Exhibit 1.8) at about 10 million barrels of brine. The change in the gas to brine ratio is very small. We estimate that there has been less than 1 SCF/STB decline since the beginning of the test. This is consistent with the bottomhole pressure falling roughly 500 psi below the bubble point pressure.

Calculated bottomhole pressures during the third quarter of 1985 ranged from 9700 psia to about 9400 psia. This indicates that the bubble point pressure is in the same range. That range is in good agreement with the 9200 psia from the P-V-T data.

On the other hand, if the reservoir brine had been saturated with natural gas at original reservoir pressure, the trapping of exsolved gas in the reservoir would have been expected to reduce the surface deduced perforation gas to brine ratio by about 4 to 5 SCF/STB over the time span shown in Exhibit 2.2.

2.3 Changes in the Produced Gas Composition

The natural gas in this reservoir is a mixture containing methane, ethane, propane, butanes, carbon dioxide, and other gases. Because the individual components have different solubilities, a gas phase in equilibrium with

Exhibit 2.2 Perforation Gas to Brine Ratio vs. Time

brine will have a different composition than the gas dissolved in the brine. The heavier hydrocarbon/methane ratios are much higher in the free gas than in the dissolved gas. The effect becomes more pronounced as still heavier hydrocarbons are examined. For instance, the propane/methane ratio contrast is greater than the ethane/methane ratio contrast.

This effect is demonstrated in Exhibit 2.3, which presents data from a differential liberation study performed by Weatherly Laboratories as a part of the P-V-T study covered by the report in Appendix A. Gas and brine from the Gladys McCall well were recombined at 30.48 SCF/STB. The bubble point pressure was 9200 psia. This fluid is representative of the reservoir brine prior to production. The pressure on the brine was reduced until a bubble large enough to sample had exsolved from the brine. This bubble was then removed and the pressure was lowered still further until another bubble could be sampled.

Exhibit 2.3 Gas Liberated During P-V-T Differential Liberation

Pressure (psia)	9200	6000	4000	2000	15
Gas/Brine Ratio (SCF/STB)	30.48	26.41	21.77	14.68	0
	Solution Gas	Gas Liberated From Solution			
Carbon Dioxide (%)	14.48	4.20	3.10	3.87	24.79
Methane (%)	82.45	89.03	91.74	92.34	73.93
Ethane (%)	2.22	4.34	3.50	2.75	1.06
Propane (%)	0.48	1.53	0.99	0.63	0.11
Butanes (%)	0.14	0.40	0.32	0.18	0.00
Pentanes (%)	0.03	0.12	0.06	0.03	0.00
C6+ (%)	0.20	0.38	0.29	0.20	0.11

The bubble of gas that was removed from the P-V-T cell and analysed would be trapped in the reservoir during normal production. This gas is richer in the heavy hydrocarbons than the original solution gas. At the same time, the gas remaining in solution in the brine, and produced up the wellbore, would become slightly depleted in ethane and heavier hydrocarbons as reservoir pressure was reduced below the bubble point.

Exhibit 2.4 presents the ethane/methane and propane/methane ratios in the total gas composition as described in Section 1.4. These values suggest that the reservoir may have been below the bubble point by December of 1985. At that time the hydrocarbon ratios were clearly below those at the start of the test.

We can estimate the change in solution gas composition as the pressure drops below the bubble point. For a 500 psi drop from a bubble point of 9200 psi, approximately 1.0 SCF/STB of gas should have been exsolved and trapped in the reservoir. Using the gas compositions in Exhibit 2.3, and assuming that all of the exsolved gas is trapped in the reservoir, we can calculate that the ethane content of the produced (solution) gas should drop from 2.22 % to 2.15 %. The propane content should drop from 0.480% to 0.444%. The ethane /methane ratio should drop from 0.269 to 0.261, and the propane/methane ratio should drop from 0.0058 to 0.0054. These changes are about as observed between the 1984 samples and the 1986-1987 samples.

The gaps of more than a year between total gas measurements preclude interpretation of Exhibit 2.4 in terms of bubble point. Some of the gaps in time were examined by making a similar plot (Exhibit 2.5) from analyses of samples from the first stage separator at times when the pressure was near to 1000 psi. Overall trends of the two plots are similar but they do not provide resolution of the question as to whether the change during 1985 was due to dropping below the bubble point or due to changes in the source of brine. The latter possibility cannot be ignored. Oil accumulation in the separators began early in 1985 and changes in the concentrations of some species in solution in produced brine changed between February and May, 1985. The most notable was an increase in barium concentration from about 100 mg/l to about 500 mg/l.

2.4 The IGT Bubble Test

During tests of Wells of Opportunity that produced gas saturated brine (G.M. Koelemay, Riddle-Saldana, and Prairie Canal wells), IGT observed that sudden increases in production rate were accompanied by a transient

**Exhibit 2.4 Ethane/Methane and Propane/Methane Ratios
in the Total Produced Gas vs. Time**

May 29, 1987

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Exhibit 2.5 Ethane/Methane and Propane/Methane Ratios in the First Stage Separator Gas (Pressure = 1000 psi) vs. Time

"bubble" of natural gas having a duration of 10's of minutes. During the "bubble", produced gas/brine ratio was higher, natural gas liquid (NGL) content of the gas was higher, and carbon dioxide content was unchanged relative to steady-state production of gas saturated brine. Understanding of the bubble was found in the phenomena described above.

IGT adopted the procedure of carefully monitoring gas rates and composition following a step increase in drawdown as a "bubble test" to determine whether the flowing bottomhole pressure was below the bubble point pressure of reservoir brine. Or, in other words, to determine whether free gas was in pores near the wellbore.

Two bubble tests have been performed at the Gladys McCall well. The first was on February 12, 1986 and the second was on April 14, 1987. Both suggested that the bottomhole pressure was below the bubble point pressure but that the amount of free gas in pores at near the critical gas saturation was very small. Details of the procedure, the test results, and interpretation are provided in the sections below.

2.4.1 Physical Phenomena That Cause The Bubble

As observed in Section 2.3, as brine pressure drops below the bubble point pressure, a portion of the gas is exsolved. This gas is much richer than the gas remaining in solution. Furthermore, this gas is trapped in the reservoir until the gas phase is continuous. The gas saturation needed to form a continuous gas phase is termed the "critical gas saturation". There is little data available on critical gas saturation, but the value is assumed to be about 3% of the total pore volume (National Petroleum Council, 1980). Data from the P-V-T study indicate that the Gladys McCall reservoir pressure would have to drop to below 2000 psia before gas would occupy 3% of the pore volume in the entire reservoir. But, in the area immediately surrounding the wellbore, brine being produced experiences large pressure gradients associated with brine converging on the wellbore and perforations.

As the BOTTOMHOLE PRESSURE drops below the bubble point pressure, gas exsolves near the wellbore. Gas saturation near the wellbore increases as

fresh brine sweeps through the high pressure gradient region, leaving its small gas phase contribution. The gas saturation will increase until the critical gas saturation is reached. Thereafter, any gas exsolving from solution will raise the saturation above critical and result in an equally small amount of free gas production up the wellbore. The reservoir volume at the critical gas saturation will increase as the pressure declines, but will always be a very small fraction of the total reservoir volume under any reasonable production scenario. Production of free gas from the high pressure gradient region near to the wellbore will be hidden by exsolution of gas further out in the reservoir.

One condition wherein production of previously trapped free gas will be noticed is temporary in nature and constitutes IGT's "bubble test". If the well had been flowing at a steady rate and had built up critical gas saturation near the wellbore, a sudden drop in the bottomhole pressure would cause the gas to expand. The amount of expansion will depend on the drop in the bottomhole pressure. For example, if the bottomhole pressure drops from 9500 psia to 9300 psia, the gas will expand approximately 9500/9300s, or about 2%. This small portion of the gas in near wellbore pore space that is at critical gas saturation will become mobile and will be produced.

The amount of gas will be small. But recall from Section 2.3 that the composition of the gas will be markedly different from the composition of the dissolved gas that is normally produced. While small gas composition changes over long periods of time may be attributed to many factors, these same small changes over a period of a few hours needed to perform a bubble test are conclusive. If the ethane/methane and propane/methane ratios increase after "bottoms-up" during a bubble test, free gas is being produced.

2.4.2 February 11, 1986 Bubble Test

On February 11, 1986 the brine rate was increased from about 23000 B/D to about 28500 B/D. IGT collected gas samples and analysed them on-site. Exhibit 2.6 presents the relevant data. As the brine rate increased, the calculated bottomhole pressure dropped from 9580 to 9250 psia. The

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Gas Content of Gladys McCall Reservoir Brine May 29, 1987

Gladys McCall Bubble Test - Hours After 08:00 on 11 FEB 1986

Exhibit 2.6 Brine Rate, First Stage Separator Gas/Brine Ratio, and Hydrocarbon Ratios vs. Time on February 11, 1986

ratios of ethane/methane and propane/methane changed significantly, as tabulated in Exhibit 2.7 and shown graphically in Exhibit 2.6.

Exhibit 2.7, Total Gas Hydrocarbon Ratio Changes
During The February 11, 1986 Bubble Test

Time in Test	Ethane/Methane	Propane/Methane
Before rate increase	0.0257	0.0056
After rate increase, before "bottoms-up"	0.0259	0.0056
About 15 minutes after bottoms-up	0.0271	0.0063
About 30 minutes after bottoms-up	0.0263	0.0061
About 60 minutes after bottom-up	0.0265	0.0060
About 3.5 hours after bottoms-up	0.0257	0.0055
About 8 days after bottoms-up	0.0259	0.0054

The increase in the hydrocarbon ratios after the slow (about one hour) increase in brine rate was obvious in the above table and in Exhibit 2.7. But, examination of Exhibit 2.6 reveals no obvious increase in the gas to brine ratio. The increase, if any, was less than 1 SCF/STB. The gas composition data (Exhibit 2.7) reveals that the maximum amount of time that free gas may have been produced was 4 hours. This leads us to conclude that free gas production was less than 5 MCF.

At bottomhole pressure and temperature 5MCF of gas would occupy less than 12 cubic feet of pore volume. Adjusting for porosity (16%) and the assumed water saturation (97%), this is equivalent to the gas content of 2500 cubic feet of reservoir rock. As the fraction of gas produced would be proportional to the drop in the bottomhole pressure, which declined from 9580 psia to 9250 psia (only 3.6% of the free gas could flow), the free gas phase at the critical gas saturation necessary to produce 5 MCF of gas should occupy 70,000 cubic feet of reservoir rock. Assuming a pay thickness of 300 feet, this volume would be a cylinder with a radius of 8.6 feet. This is an upper limit because an upper limit for free gas production (1 SCF/STB for 4 hours) was used in these calculations.

The buildup of free gas to critical gas saturation would have to have occurred over a time of days or weeks before the "bubble test". Review of the history of calculated flowing bottomhole pressure suggests that this may have occurred during the fourth quarter of 1985 at a pressure of roughly 9500 psi.

2.4.3 April 14, 1987 Bubble Test

During April 1987 the bubble test was repeated. Long term production had reduced the bottomhole pressure to about 8600 psia. Flowrates had been controlled by the first stage separator pressure, and the chokes were fully open. It was recognised that increasing the flowrate required lowering the separator pressure. If this occurred during the bubble test, changing inventories of gas in the separator volume would make it difficult to quantize any change in the gas to brine ratio.

On April 13, 1987 the first stage separator pressure was lowered from 1010 psia to 515 psia, a minimum pressure needed to maintain control of the levels in the separators and drive the disposal well. At the same time, the chokes were adjusted so that the wellhead pressure remained constant at about 1150 psia and brine rate remained constant at slightly above 22,000 STB/D. The well was then allowed to run overnight so that the gas compositions in the separators would equilibrate at the lower separator pressure and good baseline data could be obtained.

The chokes were then opened all the way at 1200 hours on April 14. The brine rate jumped from 22050 to 25300 STB/D, the wellhead pressure dropped from 1150 to 710 psia, and the calculated bottomhole pressure dropped from 8590 to 8395 psia. Exhibit 2.8 presents the changes in the gas to brine ratio, the brine flow rate, and the hydrocarbon ratios during the test. Changes in hydrocarbon ratios are also tabulated in Exhibit 2.9.

While the changes in the hydrocarbon ratios are not as clear during this test as in the February 1986 test, an increase in the hydrocarbon ratios is evident. In Exhibit 2.8 it is also clear that the production of free gas was at most trivial. The bubble, if it could be called such, consisted of less than 1 MCF of gas.

Brine Rate (STB/D) and H.P. Separator Gas/Brine Ratio (SCF/STB)

Gladys McCall Bubble Test - Hours After 10:00 on 14 APR 1987

**Exhibit 2.8 Brine Rate, First Stage Separator Gas/Brine Ratio,
and Hydrocarbon Ratios vs. Time on April 14, 1987**

Gas Content of Gladys McCall Reservoir Brine

May 29, 1987

Exhibit 2.9, First Stage Separator Gas Hydrocarbon
Ratio Changes During the April 14, 1987 Bubble Test

Time in Test	Ethane/Methane	Propane/Methane
Before rate increase	0.0264	0.0055
About 15 minutes after bottoms-up	0.0274	0.0061
About 25 minutes after bottoms-up	0.0266	0.0058
About 80 minutes after bottoms-up	0.0269	0.0057
About 2.5 hours after bottoms-up	0.0269	0.0057
About 10 hours after bottoms-up	0.0265	0.0056
About 18 hours after bottoms-up	0.0267	0.0057

This is only about 2.5 cubic feet of gas at bottomhole pressure and temperature. Adjusting for porosity (16%) and the assumed water saturation (97%) this is equivalent to the gas content of 500 cubic feet of reservoir. The fraction of free gas that would be produced is proportional to the drop in the bottomhole pressure and the resultant gas expansion (about 195 psi/8395 psia, or 2.3%). Thus one MCF of gas is estimated to have come from a reservoir volume of about 20,000 cubic feet. Assuming a thickness of 300 feet, this volume would be in a cylinder with a radius of 4.46 feet.

This data is not inconsistent with the February 1986 test, which concluded that any free gas production had to come from a cylinder with a radius LESS than 7.7 feet.

2.4.4 Discussion of Bubble Test Results

The minimal "bubble" on April 14, 1987 was a disappointing surprise to those of us who had observed and sampled bubbles during the tests of Wells of Opportunity. However, some algebra has revealed that the properties of the Gladys McCall reservoir are such that a dramatic "bubble" should not be expected.

The mathematical model that provides insight consists of examining a right circular cylinder in the reservoir that is concentric with the

wellbore and has a radial thickness Δr . Brine that is below its bubble point pressure and is radially flowing through this cylinder of reservoir rock liberates about 0.002 SCF/STB of gas per psi of pressure drop across the radial thickness Δr . But, that flowing pressure drop is related to the dimensions of the cylinder and brine rate by Darcies Law. Equating the pressure drops from the equations for these two phenomena makes possible solving for the time required to achieve critical gas saturation as a function of radial distance from the wellbore, brine rate, and reservoir parameters. In conventional oil field units, the resultant equation is:

$$t = \frac{4.59 \pi^2 P_b \phi S_{gc} K h^2 r^2}{(.002) P_b T \mu Q^2}$$

where t = Time, days

P = Pressure, psia

T_b = Temperature Base, Deg. K.

ϕ = Porosity, fraction

S_{gc} = Critical Gas Saturation, fraction

K = Permeability, Darcies

h = Pay Zone Thickness, feet

r = Radius, feet

.002 = Gas exsolved for a pressure drop of 1 psi, SCF/STB

P_b = Pressure Base, psia

T = Temperature, Deg.K.

μ = Brine viscosity, cp.

Q = Brine rate, STB/D

Solving this equation for the Gladys McCall well for a flow rate of 25,000 STB/D and for a radius of 10 feet reveals that about 320 days or more than 10 months would be required to achieve critical gas saturation. In contrast, for the Wells of Opportunity where the bubbles were observed, permeability and thickness were both about an order of magnitude smaller than for the Gladys McCall well. For a brine rate of 5000 STB/D, such well would achieve critical gas saturation 10 feet from the wellbore in the much shorter time of about a week.

This very slow buildup of the critical gas saturation in the reservoir, coupled with not being able to change the bottomhole pressure more than a few percent, lead us to conclude that there is no reasonable engineering basis to support expectations of a large bubble of free gas being produced during April 1987. The bubble test was successful in that it did provide a qualitative indication that the bottomhole pressure was below the bubblepoint pressure of the reservoir brine.

3.0 CONCLUSIONS FOR THE GLADYS McCALL WELL

The Gladys McCall Sand #8 was not saturated with gas at the original reservoir pressure of 12783 psia. The bubble point pressure for the reservoir brine was probably between 9400 psia and 10000 psia. The tests and interpretations thereof used to reach this conclusion are summarized below.

- The 1983 P-V-T analyses found a recombination bubble point pressure of 9200 psia for a gas to brine ratio of 30.25 SCF/STB. This result closely matched the methane solubility predicted by Blount's equation. The methane solubility predicted by Blount's equation, at 294 F and 95000 ppm NaCl, is 30.30 SCF/STB at 9200 psia and 35.85 SCF/STB at 12783 psia.
- The produced gas to brine ratio appeared to start a very slow decline in the latter half of 1985. Bottomhole pressure had never been below 10,500 psia prior to the successful inhibitor pill in June 1985. After that pill, the vast majority of production has been at rates high enough for flowing bottomhole pressure to be below 10,000 psi and it got as low as 9400 psi during the latter half of 1985. The decline in the produced gas to brine ratio is assumed to be caused by gas being liberated in the reservoir due to the bottomhole pressure falling below the bubblepoint pressure.
- Changes in the produced brine composition (the barium concentration in the brine jumped over 400% between February and May 1985) and the characteristics of the produced hydrocarbons (oil production was first noticed during January 1985) may indicate

arrival at the wellbore of brine from a different reservoir compartment having a different gas content. But, if so, This brine is also undersaturated with natural gas and therefore the major conclusion remains unchanged.

- The produced gas composition changed slightly between April and December 1985 (There were no gas analyses during this period). The change, a slight reduction in the ethane/methane and propane/methane ratios, is consistent with gas being liberated from the brine in the reservoir. The calculated bottomhole pressure ranged from 9400 psia and 10800 psia and the majority of production was with bottomhole pressure below 10,000 psi. Again, there remains a possibility that a previously isolated brine started being produced during this time frame as discussed above.
- The February 11, 1986 bubble test provided conclusive evidence that the bottomhole pressure had been below the bubble point prior to that time. The lowest bottomhole pressure experienced before the test was 9400 psia in October 1985. Therefore the bubble point pressure of original reservoir brine must have been above 9400 psia.
- The April 14, 1987 bubble test indicated that the bubble point pressure was above 8600 psia. The result was redundant after the 1986 test but the small size of the 1987 bubble test motivated analysis that provided additional insight into the design and interpretation of future bubble tests.

4.0 OTHER DESIGN WELLS AND RECOMMENDATIONS

The Gladys McCall reservoir brine was originally undersaturated with natural gas and bottomhole pressure has been drawn to below the bubble point pressure. We know of no additional tests, that do not require continuing production for years, that could improve definition of the original bubble point pressure for this reservoir. While evidence supporting the undersaturated conclusion is strong, the minimal quantity and questionable quality of much of the data make interpretation and reporting both difficult and tedious.

One can readily conclude from published data that none of the design wells have produced brine that was saturated at original reservoir temperature and pressure. There is a P-V-T report for every tested sand in every design well that shows a bubble point thousands of psi below original reservoir pressure. The following statement by DOE's prime contractor for the Sweet Lake and Gladys McCall wells is in the CK GeoEnergy Corporation minutes of the January 10, 1984 DOE/INDUSTRY GEOPRESSURE GEOTHERMAL RESOURCE DEVELOPMENT PROGRAM WORKING GROUP MEETING:

" Now this is the fourth reservoir limit test that we've done, two at Sweet Lake and two at Gladys McCall. All of them show roughly the same thing. They are about 80% saturated. Never mind the brine is different, never mind the gas to water ratios are different. They calculate out to be about 80% saturated."

We have not found reports wherein DOE's prime contractors for the other two design wells have explicitly reported on whether the reservoir brine was saturated with natural gas. But, detailed examination of the data by IGT has failed to make a plausible case for either of them being saturated. In the case of the DOW-DOE L.R. Sweezy No.1 well, problems in measuring gas production were so great that little data was reported and the errors therein may well be 30% or more.

For the Pleasant Bayou No. 2 well, production of 4.5 million barrels of brine was accompanied by little, if any, change in reported gas/brine ratio. For the last 3.0 million barrels, brine rate averaged a reported 18,375 STB/D. Under these conditions, appreciable drawdown must have occurred. With the exception of cryocondensates and scale related analyses, it appears that no fluid analyses were performed during the last 3 million barrels. Nevertheless, the lack of decline in reported gas/brine ratio out of the separators makes it unlikely that the reservoir brine was saturated with natural gas at original pressure.

It is recommended that future design well tests involve much heavier emphasis upon definitive determination as to whether reservoir brine is saturated with natural gas. Recommendations to achieve this include:

- Accurate gas rate measurement, including sufficient gas analyses to be confident that correct values are being used for gas composition dependent factors in the orifice equation. Correction of rates for water vapor and carbon dioxide content of the gas passing through the meters is essential.
- P-V-T studies performed in laboratories capable of pressures at least as high as original reservoir pressure. Recombinations should be performed at gas to brine ratios higher than the "produced" gas to brine ratio if higher ratios are needed to reach the original reservoir pressure.
- Hydrocarbon and brine sample collection and analysis in a standard manner after every month or after every million barrels of production, whichever is more frequent, as well as in conjunction with changes in production rate. Total produced gas, including gas remaining in solution in brine and carbon dioxide liberated from brine by acid at atmospheric pressure, needs to be determined each time.
- Bubble tests should be performed at those times when prior understanding makes it credible that production has reduced near wellbore pressure to below the bubble point pressure. Note that the bubble test will be much more definitive of the bubble point pressure on the Pleasant Bayou well than on the Gladys McCall well. This is because the reservoir thickness is only 1/5th as large and the time to charge pores to critical gas saturation varies as the square of thickness.

APPENDIX A

Weatherly Laboratories, Inc.

Reservoir Fluid Analysis

Gladys McCall Well No. 1, Sand No. 8

RESERVOIR FLUID ANALYSIS

FOR

TECHNADRIL-FENIX & SCISSON, INC.

GLADYS MCCALL WELL NO. 1, SAND 8
EAST CRAB LAKE FIELD
CAMERON PARISH, LOUISIANA

WEATHERLY LABORATORIES, INC.

J. E. WEATHERLY, JR.
CHAIRMAN

223 GEORGETTE LAFAYETTE, LA 70506
PHONE (318) 232-4877

JOHN D. NEAL
PRESIDENT
BRYAN SONNIER
VICE PRESIDENT

OCTOBER 24, 1983

TECHNADRIL-FENIX & SCISSON, INC.
3 NORTHPOINT DRIVE
SUITE 200
HOUSTON, TEXAS 77060

ATTENTION: MR. LARRY DURRETT

RE: RESERVOIR FLUID STUDY
GLADYS MCCALL WELL NO. 1, SAND 8
EAST CRAB LAKE FIELD
CAMERON PARISH, LOUISIANA

GENTLEMEN:

ATTACHED ARE THE RESULTS OF THE ANALYSES OF THE CHEMICAL AND PHYSICAL CHARACTERISTICS OF A RECOMBINED RESERVOIR FLUID SAMPLE FROM THE SUBJECT WELL. SURFACE SEPARATOR SAMPLES WERE COLLECTED FROM THIS WELL BY A REPRESENTATIVE OF WEATHERLY LABORATORIES, INC. ON OCTOBER 8, 1983. THE GAS-WATER RATIO (GWR) MEASURED ON THIS TEST, 25.01 CUBIC FEET OF SEPARATOR GAS PER BARREL OF SEPARATOR LIQUID, WAS USED AS THE BASIS FOR ONE RECOMBINATION. THE RESULTANT RESERVOIR FLUID EXHIBITED A BUBBLE POINT OF 9,200 PSIA AT THE RESERVOIR TEMPERATURE 290 DEGREES FAHRENHEIT.

OTHER RECOMBINATIONS WERE DONE TO DETERMINE A BUBBLE POINT -VS- GWR RELATIONSHIP. A DIFFERENTIAL LIBERATION AND VISCOSITY MEASUREMENTS WERE PERFORMED USING RESERVOIR FLUID RECOMBINED TO THE PRODUCED GWR AT THE TIME OF SAMPLING.

WE WISH TO THANK YOU FOR THIS OPPORTUNITY OF SERVING YOU. SHOULD THERE BE ANY QUESTIONS CONCERNING THIS REPORT, PLEASE CONTACT US.

YOURS VERY TRULY

JOHN NEAL

CC: MR. JONNE BERNING
TECHNADRIL-FENIX & SCISSON, INC.
RT. 1, BOX 36-B
GRAND CHENIER, LA 70643

LAB. NO. N2106-10457

TECHNADRIL-FENIX & SCISSON, INC.
GLADYS MCCALL WELL NO. 1, SAND 8
EAST CRAB LAKE FIELD

GEOPRESSURE/GEOTHERMAL PROJECT SAMPLING AND LABORATORY PROCEDURE

- 1) WATER VAPOR CONTENT OF SEPARATOR GAS WAS DETERMINED BY FLOWING GAS FROM A METERING VALVE ON THE SEPARATOR GAS METER RUN THROUGH A WEIGHING TUBE (INDICATOR DRIERITE (CaSO_4) WEIGHED TO 0.1 MILLIGRAM) TO A RUSKA GASOMETER. SEPARATOR GAS SAMPLES WERE TAKEN FROM THE SAME PLACE INTO 1 GALLON STAINLESS STEEL (S.S.) CYLINDERS AFTER THOROUGH PURGING. SEPARATOR LIQUID SAMPLE CYLINDERS (1000 ML. S.S.) WERE FIRST CHARGED WITH SEPARATOR GAS TO FULL SEPARATOR PRESSURE. THE LIQUID CYLINDERS WERE THEN CONNECTED TO THE SEPARATOR WATER SAMPLING POINT BY A S.S. TUBE LONG ENOUGH TO LOOP THROUGH A COOLING BATH. THE WATER TRANSFER LINE WAS THEN SLOWLY AND THOROUGHLY PURGED AT THE CYLINDER. SEPARATOR WATER WAS LET INTO THE CYLINDER BY SLOWLY BLEEDING GAS FROM THE TOP VALVE. AT NO TIME WAS THE WATER CAUGHT IN THE CYLINDER ALLOWED TO DROP BELOW SEPARATOR PRESSURE.
- 2) FLASH LIBERATION OF GAS FROM SEPARATOR WATER WAS ACCOMPLISHED BY USING A WEIGHED SEPARATOR FLASK. THIS SEPARATOR FLASK WAS CONNECTED TO THE OUTLET OF A SEPARATOR WATER CYLINDER BY A SHORT CAPILLARY LINE. GAS FROM THE SEPARATOR FLASK PASSED THROUGH A WEIGHED DRYING TUBE THROUGH A GLASS CYLINDER (~ 300 ML.) TO A RUSKA GASOMETER. A VACUUM VALVE AND A MERCURY MANOMETER WAS CONNECTED TO THE GAS MANIFOLD BETWEEN THE DRYING TUBE AND THE GASOMETER. BEFORE COMMENCING THE FLASH, THE ENTIRE FLASH GAS MANIFOLD WAS EVACUATED AND THEN FILLED WITH HELIUM TO ATMOSPHERIC PRESSURE. A KNOWN VOLUME OF SEPARATOR WATER WAS PUSHED OUT OF THE SAMPLE CYLINDER AT A PRESSURE SLIGHTLY ABOVE FIELD SEPARATOR PRESSURE BY USE OF A CALIBRATED MERCURY PUMP. THE VOLUME OF STOCK TANK WATER PRODUCED WAS DETERMINED BY ITS WEIGHT AND DENSITY. THE VOLUME OF DRY GAS EVOLVED WAS DETERMINED WITH THE GASOMETER. THIS GAS VOLUME WAS SUBJECT TO $\pm 2\%$ ERROR DUE TO THE VERY SMALL AMOUNTS MEASURED. THE GAS WAS CHARGED TO A CHROMATOGRAPH FOR ANALYSIS FROM THE GLASS CYLINDER.
- 3) PHYSICAL RECOMBINATION OF SEPARATOR EFFLUENTS:
SEPARATOR GAS WAS CHARGED INTO A TEMPERATURE CONTROLLED CELL. THE VOLUME OF THIS WINDOWED CELL IS KNOWN FOR ANY PRESSURE AND TEMPERATURE. THE PRESSURE OF THE GAS IN THE CELL WAS MEASURED WITH A MERCURY MANOMETER AND A BAROMETER. THIS CALCULATED GAS VOLUME WAS SUBJECT TO A $\pm 1\%$ ERROR DUE TO THE SMALL AMOUNT CHARGED TO THE CELL. A VOLUME OF SEPARATOR WATER WAS CHARGED INTO THE WINDOWED CELL BY USE OF A CALIBRATED MERCURY PUMP. THE WATER WAS METERED AND MEASURED AT A PRESSURE SLIGHTLY ABOVE FIELD SEPARATOR PRESSURE. FOUR RECOMBINATIONS WERE DONE IN ORDER TO PRODUCE A SATURATION PRESSURE-VS-GAS WATER RATIO CURVE. RESERVOIR FLUID RESULTING FROM RECOMBINATION OF THE PRODUCED GWR (FIFTH RECOMBINATION) WAS USED TO PERFORM A DIFFERENTIAL LIBERATION AND VISCOSITY MEASUREMENT.

TECHNADRIL-FENIX & SCISSON, INC.
GLADYS MCCALL WELL NO. 1, SAND 8
EAST CRAB LAKE FIELD

- 4) PRESSURE-VOLUME RELATIONS OF RECOMBINED RESERVOIR FLUID AT RESERVOIR TEMPERATURE:
EACH DATUM OF PRESSURE-VOLUME RELATIONS WAS CORRECTED FOR MERCURY PUMP CALIBRATION, MANIFOLD EXPANSION, CELL EXPANSION, MERCURY COMPRESSIBILITY AND MERCURY THERMAL EXPANSION. LIQUID VOLUME PERCENT WAS DETERMINED BY CALIBRATED CATHETER AND BY DATA INTERPRETATION.
- 5) DIFFERENTIAL LIBERATION OF RESERVOIR FLUID AT RESERVOIR TEMPERATURE:
GAS FROM EACH PRESSURE DECREMENT OF THE DIFFERENTIAL LIBERATION WAS ANALYZED IN THE SAME MANNER AS DESCRIBED IN 2), (FLASH LIBERATION). DIFFERENTIAL LIQUID CHANGES WERE NOTED.
- 6) VISCOSITY OF RESERVOIR FLUID WAS MEASURED BY MR. J. R. COMEAU OF WEATHERLY LABORATORIES. A DESCRIPTION OF MR. COMEAU'S EXPERIMENTAL PROCEDURES IS GIVEN BELOW:
GEOTHERMAL WATER VISCOSITIES WERE MEASURED USING A RUSKA ROLLING BALL VISCOMETER WITH AN ELECTRONIC DETECTION SYSTEM TO PREVENT ELECTROLYSIS. THE DETECTION SYSTEM CONSISTS OF A SENSITIVE AUDIO AMPLIFIER WITH POSITIVE FEEDBACK ADJUSTED JUST BELOW OSCILLATION. THE BALL IS HELD BY AN ELECTROMAGNET. WHEN CURRENT TO THE MAGNET IS TURNED OFF, A PULSE IS PRODUCED WHICH STARTS A DIGITAL TIMER. WHEN THE BALL STRIKES THE CONTACT AT THE OTHER END OF THE VISCOMETER THE ELECTRICAL DISTURBANCE PRODUCED IS GENERALLY AMPLIFIED AND TURNS THE TIMER OFF. TIMES WERE MEASURED TO 1/100TH OF A SECOND AND AVERAGED. THE VISCOMETER WAS CALIBRATED AT EACH OF TWO ANGLES USING DISTILLED WATER AT SEVERAL TEMPERATURES. THESE RESULTS WERE USED ALONG WITH PREVIOUS RESULTS TO OBTAIN NEW CALIBRATION CURVES. t p VERSUS u WERE PLOTTED TO OBTAIN CALIBRATION.
 t = ROLL TIME, (SECONDS)
 p = DENSITY DIFFERENCE BETWEEN BALL AND RESERVOIR FLUID, (gm./ml.)
 u = VISCOSITY, (CENTIPOISE)

THE VISCOMETER WAS CHARGED WITH RESERVOIR FLUID AND RUN AT 290°F AT 1000 LB. INTERVALS. THE VISCOSITIES HAD A PROBABLE ERROR OF ± 0.01 CENTIPOISE.

NOTE: ALL DATA FOR PRESSURES GREATER THAN 11,000 PSI WERE OBTAINED BY EXTRAPOLATION. THE VISCOSITY DATA ARE ABOUT 0.1 CENTIPOISE LOWER THAN THE PREVIOUS REPORT (N1901-10224 OF APRIL 1983). WE BELIEVE THAT THIS IS DUE TO A FILM BUILDUP IN THE 404 S.S. BARREL OF THE OLD E.L.I. VISCOMETER. THIS FILM DID NOT FORM IN THE 316 S.S. BARREL OF THE RUSKA VISCOMETER.

FIELD DATA FOR WEATHERLY LABORATORY INVESTIGATION

WELL RECORD

COMPANY	TECHNADRIL-FENIX & SCISSON, INC.
WELL	GLADYS MCCALL NO. 1
FIELD	EAST CRAB LAKE
PARISH AND STATE	CAMERON, LOUISIANA

FIELD CHARACTERISTICS

FORMATION NAME	
SAND NAME AND DESIGNATION	8
DATE COMPLETED	
ORIGINAL RESERVOIR PRESSURE	

WELL CHARACTERISTICS

ORIGINAL PRODUCED GAS-LIQUID RATIO

PERFORATIONS		
ELEVATIONS		
TOTAL DEPTH		
LAST RESERVOIR PRESSURE	12,783	PSIA
RESERVOIR TEMPERATURE	290	DEGREES F

SAMPLING CONDITIONS

DATE SAMPLED	10-8-83	
TUBING PRESSURE, FLOWING	12,676	PSIG
PRIMARY SEPARATOR TEMPERATURE (METER RUN)	97	DEGREES F, (SEP.) 268°F
PRIMARY SEPARATOR PRESSURE	500	PSIG
PRIMARY SEPARATOR GAS RATE (WET GAS)	349,750	SCF/DAY
SEPARATOR LIQUID RATE	13,987	BBL.S./DAY
GAS-LIQUID RATIO (SEPARATOR)	25.01	SCF/BBL.SEP.WATER
SHRINKAGE FACTOR (VOL.S.T.WATER @ 60°F/VOL.SEP.WATER)	0.9437	
GAS-LIQUID RATIO (STOCK TANK)	26.50	SCF/BBL.S.T.WATER
PRESSURE BASE	15.025	PSIA @ 60 DEGREES F

NOTE: FOR DRY GAS, 24.95 SCF/BBL. SEP. WATER @ SEP. CONDITIONS.
26.44 SCF/BBL. S.T. WATER @ 60°F.

TECHNADRIL-FENIX & SCISSON, INC.
GLADYS MCCALL WELL NO. 1, SAND 8
EAST CRAB LAKE FIELD

CALCULATION OF GAS RATE, 10-8-83 TEST
(Factors from GPSA Engineering Data Book)

$\sqrt{H_w P_f}$ =	107.5735	H_w =	22.47 "H ₂ O ,	P_f =	515 psia
F_b =	113.9873	D =	2.626 " ,	d =	0.750 "
F_{pb} =	0.9804		15.025 psia		
F_r =	1.0004	b =	0.0470		
Y_2 =	1.0003	H_w/P_f =	0.042 ,	d/D =	0.286
F_g =	1.2116	Gravity =	0.6812 ,	F_g =	$\sqrt{1 / 0.6812}$
F_{tf} =	0.9662	Temp. =	97 degrees F ,	F_{tf} =	$\sqrt{520 / 557}$
F_{pv} =	1.0348	$p_{Tr'}$ =	1.547 ,	$p_{Pr'}$ =	0.751
		Z =	0.9339 ,	F_{pv} =	$\sqrt{1 / Z}$
		Epsilon =	12.5		

$$Q = \sqrt{H_w P_f} \times F_b \times F_{pb} \times F_r \times Y_2 \times F_g \times F_{tf} \times F_{pv} \times 24$$

$$Q = 349,750 \text{ SCF/day @ 15.025 PSIA @ 60 Degrees F (WET)}$$

TECHNADRIL-FENIX & SCISSON, INC.
GLADYS MCCALL WELL NO. 1, SAND 8
EAST CRAB LAKE FIELD

RESERVOIR FLUID SUMMARY

Reservoir Temperature, Degrees F	290
Saturation Pressure at 290 Degrees, Psia	9200
Compressibility of Reservoir Oil at 290 Degrees F	
Vol. per Vol. per Psi x 10 ⁶	
From 9200 Psia to 10000 Psia	3.00
From 10000 Psia to 11000 Psia	2.81
From 11000 Psia to 12783 Psia	2.76
	<u>DIFF. LIB.</u>
Saturated Oil at 9200 Psia, 290 Degrees F	
Density, Gms. per Ml.	1.01221
Lbs. per Bbl.	354.78
Specific Volume, Cu.Ft. per Lb.	0.015825
Viscosity, Centipoise	0.277
Formation Volume Factor, Bbls. per Bbl.	
"Equivalent Stock Tank Oil" at 60 Degrees F	1.0575 * , 1.0532
Solution Gas-Oil Ratio, Cu.Ft. per Bbl.	30.38 * , 33.51 WET
"Equivalent Stock Tank Oil" at 60 Degrees F	30.19 * , 31.60 DRY
Reservoir Oil at 12783 Psia 290 Degrees F	
Density, Gms. per Ml.	1.02255
Lbs. per Bbl.	358.40
Specific Volume, Cu.Ft. per Lb.	0.015665
Viscosity, Centipoise	0.310
Formation Volume Factor, Bbl. per Bbl.	
"Equivalent Stock Tank Oil" at 60 Degrees F	1.0468 * , 1.0426

NOTE: REFERENCES TO 'OIL' ABOVE SHOULD READ 'WATER'.

* BASED ON SEPARATOR WATER FLASH.

TECHNADRIL-FENIX & SCISSON, INC.
GLADYS MCCALL WELL NO. 1, SAND 8
EAST CRAB LAKE FIELD

COMPOSITE LABORATORY DATA 290 DEGREES F

RECOMBINATION (1) 20.00 SCF SEP. GAS @ 15.025 PSIA & 60°F/BBL. SEP. WATER @ SEP. CONDITIONS.

PRESSURE VOLUME RELATIONS							
PRESSURE	RELATIVE VOLUME	SPECIFIC VOLUME	LIQUID VOLUME PERCENT	FORMATION VOLUME FACTOR Bo	RELATIVE OIL VOLUME	OIL DENSITY GM/CC	SOLUTION GAS-OIL RATIO PER BARREL STOCK TANK OIL AT 60°F DRY ** WET **
PSIA	V/Vsat Bt	Cu. Ft./Lb.		**			
12783 RES.	0.9830	0.015643		1.0444			24.90 25.07
11000	0.9879	0.015721		1.0496			24.90 25.07
10000	0.9907	0.015766		1.0526			24.90 25.07
9000	0.9935	0.015811		1.0556			24.90 25.07
8000	0.9963	0.015855		1.0586			24.90 25.07
7000	0.9993	0.015903		1.0618			24.90 25.07
6730 B.P.	1.0000	0.015914	100.00	1.0625			24.90 25.07
6707	1.0001	0.015916	TINY BUBBLE				
6605	1.0004	0.015920	BUBBLE				
6501	1.0008	0.015927	99.99				
6009	1.0027	0.015957	99.94				
5000	1.0068	0.016022	99.83				
4000	1.0112	0.016092	99.68				
3000	1.0191	0.016218	99.20				
2004	1.0331	0.016441	98.13				
1000	1.0768	0.017136	94.42				
71	4.4075	0.070141	23.13				

NOMENCLATURE:

V/VSAT. IS THE VOLUME OF FLUIDS (OIL AND GAS) AT THE INDICATED TEMPERATURE AND PRESSURE RELATIVE TO THE VOLUME OF SATURATED OIL AT BUBBLE-POINT PRESSURE AND INDICATED TEMPERATURE.

Bo IS THE VOLUME OF OIL AT RESERVOIR TEMPERATURE AND INDICATED PRESSURE RELATIVE TO THE VOLUME OF EQUIVALENT STOCK TANK OIL MEASURED AT 60 DEGREES F.

GAS-OIL RATIO, IS CUBIC FEET OF GAS AT 15.025 PSIA AND 60 DEGREES F, PER BARREL OF STOCK TANK OIL AT 60 DEGREES F.

NOTE: ** BASED ON SEPARATOR WATER FLASH.
REF. TO 'OIL' ABOVE SHOULD READ 'WATER'.

TECHNADRIL-FENIX & SCISSON, INC.
GLADYS MCCALL WELL NO. 1, SAND 8
EAST CRAB LAKE FIELD

COMPOSITE LABORATORY DATA 290 DEGREES F

RECOMBINATION (2) 18.00 SCF SEP. GAS @ 15.025 PSIA & 60°F/BBL. SEP. WATER @ SEP. CONDITIONS.

PRESSURE VOLUME RELATIONS							
PRESSURE	RELATIVE VOLUME	SPECIFIC VOLUME	LIQUID VOLUME	FORMATION VOLUME FACTOR	RELATIVE OIL VOLUME	OIL DENSITY	SOLUTION GAS-OIL RATIO
PSIA	V/V _{sat} Bt	Cu.Ft./Lb.	PERCENT	Bo **		GM/CC	PER BARREL STOCK TANK OIL AT 60°F DRY ** WET **
12783 RES.	0.9803	0.015635		1.0432			22.78 22.95
11000	0.9852	0.015713		1.0484			22.78 22.95
10000	0.9880	0.015758		1.0514			22.78 22.95
9000	0.9908	0.015802		1.0544			22.78 22.95
8000	0.9937	0.015849		1.0575			22.78 22.95
7000	0.9966	0.015895		1.0606			22.78 22.95
6000	0.9994	0.015939		1.0636			22.78 22.95
5785 B.P.	1.0000	0.015949	100.00	1.0642			22.78 22.95
5522	1.0010	0.015965	99.98				
5000	1.0036	0.016006	99.87				
4013	1.0081	0.016078	99.70				
3000	1.0148	0.016185	99.33				
2000	1.0272	0.016383	98.41				
1000	1.0667	0.017013	95.04				
500	1.1582	0.018472	87.65				
159	1.7489	0.027893	58.11				

NOMENCLATURE:

V/V_{SAT}. IS THE VOLUME OF FLUIDS (OIL AND GAS) AT THE INDICATED TEMPERATURE AND PRESSURE RELATIVE TO THE VOLUME OF SATURATED OIL AT BUBBLE-POINT PRESSURE AND INDICATED TEMPERATURE.

Bo IS THE VOLUME OF OIL AT RESERVOIR TEMPERATURE AND INDICATED PRESSURE RELATIVE TO THE VOLUME OF EQUIVALENT STOCK TANK OIL MEASURED AT 60 DEGREES F.

GAS-OIL RATIO, IS CUBIC FEET OF GAS AT 15.025 PSIA AND 60 DEGREES F, PER BARREL OF STOCK TANK OIL AT 60 DEGREES F.

NOTE: ** BASED ON SEPARATOR WATER FLASH.
REF. TO 'OIL' ABOVE SHOULD READ 'WATER'.

TECHNADRIL-FENIX & SCISSON, INC.
GLADYS MCCALL WELL NO. 1, SAND 8
EAST CRAB LAKE FIELD

COMPOSITE LABORATORY DATA 290 DEGREES F

RECOMBINATION (3) 15.00 SCF SEP. GAS @ 15.025 PSIA & 60°F/BBL. SEP. WATER @ SEP. CONDITIONS.

PRESSURE VOLUME RELATIONS							
PRESSURE	RELATIVE VOLUME	SPECIFIC VOLUME	LIQUID VOLUME PERCENT	FORMATION VOLUME FACTOR B_o **	RELATIVE OIL VOLUME	OIL DENSITY GM/CC	SOLUTION GAS-OIL RATIO PER BARREL STOCK TANK OIL AT 60°F DRY ** WET **
PSIA	V/V _{sat} Bt	Cu.Ft./Lb.					
12783 RES.	0.9772	0.015622		1.0422			19.61 19.77
11000	0.9821	0.015700		1.0474			19.61 19.77
10000	0.9849	0.015745		1.0504			19.61 19.77
9000	0.9876	0.015788		1.0533			19.61 19.77
8000	0.9904	0.015833		1.0563			19.61 19.77
7000	0.9931	0.015876		1.0591			19.61 19.77
6000	0.9959	0.015920		1.0621			19.61 19.77
5000	0.9987	0.015965		1.0651			19.61 19.77
4550 B.P.	1.0000	0.015986	100.00	1.0665			19.61 19.77

4500	1.0002	0.015989	BUBBLE
4000	1.0022	0.016021	99.93
3500	1.0046	0.016060	99.84
3000	1.0080	0.016114	99.64
2000	1.0188	0.016287	98.86
1000	1.0526	0.016827	95.95
500	1.1318	0.018093	89.36
197	1.4605	0.023348	69.31

NOMENCLATURE:

V/V_{SAT}. IS THE VOLUME OF FLUIDS (OIL AND GAS) AT THE INDICATED TEMPERATURE AND PRESSURE RELATIVE TO THE VOLUME OF SATURATED OIL AT BUBBLE-POINT PRESSURE AND INDICATED TEMPERATURE.

B_o IS THE VOLUME OF OIL AT RESERVOIR TEMPERATURE AND INDICATED PRESSURE RELATIVE TO THE VOLUME OF EQUIVALENT STOCK TANK OIL MEASURED AT 60 DEGREES F.

GAS-OIL RATIO, IS CUBIC FEET OF GAS AT 15.025 PSIA AND 60 DEGREES F, PER BARREL OF STOCK TANK OIL AT 60 DEGREES F.

NOTE: ** BASED ON SEPARATOR WATER FLASH.
REF. TO 'OIL' ABOVE SHOULD READ 'WATER'.

TECHNADRIL-FENIX & SCISSON, INC.
GLADYS MCCALL WELL NO. 1, SAND 8
EAST CRAB LAKE FIELD

COMPOSITE LABORATORY DATA 290 DEGREES F

RECOMBINATION (4) 10.00 SCF SEP. GAS @ 15.025 PSIA & 60°F/BBL. SEP. WATER @ SEP. CONDITIONS.

PRESSURE VOLUME RELATIONS							
PRESSURE	RELATIVE VOLUME	SPECIFIC VOLUME	LIQUID VOLUME	FORMATION VOLUME FACTOR	RELATIVE OIL VOLUME	OIL DENSITY	SOLUTION GAS-OIL RATIO
PSIA	V/Vsat Bt	Cu.Ft./Lb.	PERCENT	Bo **	VOLUME	GM/CC	PER BARREL STOCK TANK OIL AT 60°F DRY ** WET **
12783 RES.	0.9721	0.015592		1.0397			14.32 14.48
11000	0.9769	0.015669		1.0448			14.32 14.48
10000	0.9797	0.015714		1.0478			14.32 14.48
9000	0.9825	0.015759		1.0508			14.32 14.48
8000	0.9853	0.015804		1.0538			14.32 14.48
7000	0.9881	0.015849		1.0568			14.32 14.48
6000	0.9909	0.015894		1.0598			14.32 14.48
5000	0.9938	0.015941		1.0629			14.32 14.48
4000	0.9967	0.015987		1.0660			14.32 14.48
3000	0.9996	0.016034		1.0691			14.32 14.48
2855 B.P.	1.0000	0.016040	100.00	1.0695			14.32 14.48
2500	1.0022	0.016075	99.89				
2000	1.0068	0.016149	99.58				
1000	1.0310	0.016537	97.53				
500	1.0862	0.017432	92.70				
228	1.2608	0.020223	79.93				

NOMENCLATURE:

V/VSAT. IS THE VOLUME OF FLUIDS (OIL AND GAS) AT THE INDICATED TEMPERATURE AND PRESSURE RELATIVE TO THE VOLUME OF SATURATED OIL AT BUBBLE-POINT PRESSURE AND INDICATED TEMPERATURE.

Bo IS THE VOLUME OF OIL AT RESERVOIR TEMPERATURE AND INDICATED PRESSURE RELATIVE TO THE VOLUME OF EQUIVALENT STOCK TANK OIL MEASURED AT 60 DEGREES F.

GAS-OIL RATIO, IS CUBIC FEET OF GAS AT 15.025 PSIA AND 60 DEGREES F, PER BARREL OF STOCK TANK OIL AT 60 DEGREES F.

NOTE: ** BASED ON SEPARATOR WATER FLASH.
REF. TO 'OIL' ABOVE SHOULD READ 'WATER'.

TECHNADRIL-FENIX & SCISSON, INC.
GLADYS MCCALL WELL NO. 1, SAND 8
EAST CRAB LAKE FIELD

COMPOSITE LABORATORY DATA 290 DEGREES F

RECOMBINATION (5) 25.01 SCF SEP. GAS @ 15.025 PSIA & 60°F/BBL. SEP. WATER @ SEP. COND. - PRODUCED GWR

PRESSURE VOLUME RELATIONS			DIFFERENTIAL LIBERATION					
PRESSURE	RELATIVE VOLUME	SPECIFIC VOLUME	LIQUID VOLUME	FORMATION VOLUME FACTOR	FORMATION VOLUME FACTOR	OIL VISCOSITY	SOLUTION GAS-OIL RATIO	
PSIA	V/Vsat Bt	Cu.Ft./Lb.	VOLUME PERCENT	Bo **	Bo	CENTIPOISE	PER BARREL STOCK TANK OIL AT 60°F	
							DRY	WET
12783 RES.	0.9899	0.015665		1.0468	1.0426	0.310	31.60	33.51
11000	0.9948	0.015743		1.0520	1.0477	0.293	31.60	33.51
10500	0.9962	0.015765		1.0535	1.0492		31.60	33.51
10000	0.9976	0.015787		1.0550	1.0507	0.284	31.60	33.51
9500	0.9991	0.015811		1.0565	1.0523	0.279	31.60	33.51
9200 B.P.	1.0000	0.015825	100.00	1.0575	1.0532	0.277	31.60	33.51
9000	1.0007	0.015836	99.99			0.275		
8500	1.0023	0.015861	99.97					
8000	1.0042	0.015891	99.94			0.267		
7500	1.0058	0.015917	99.90					
7000	1.0078	0.015948	99.86			0.260		
6000	1.0115	0.016007	99.79		1.0613	0.254	27.53	29.36
5000	1.0160	0.016078	99.64			0.249		
4000	1.0219	0.016172	99.35		1.0655	0.249	22.89	24.60
3000	1.0309	0.016314	98.76			0.252		
2000	1.0483	0.016589	97.41		1.0692	0.257	15.80	17.23
1000	1.1022	0.017442	92.91			0.262		
500	1.2238	0.019367	83.80			0.263		
250	1.5178	0.024019	67.61					
105	2.7088	0.042867	37.90					
15								
15*					1.0000		0.00	0.00

NOMENCLATURE:

V/VSAT. IS THE VOLUME OF FLUIDS (OIL AND GAS) AT THE INDICATED TEMPERATURE AND PRESSURE RELATIVE TO THE VOLUME OF SATURATED OIL AT BUBBLE-POINT PRESSURE AND INDICATED TEMPERATURE.

Bo IS THE VOLUME OF OIL AT RESERVOIR TEMPERATURE AND INDICATED PRESSURE RELATIVE TO THE VOLUME OF EQUIVALENT STOCK TANK OIL MEASURED AT 60 DEGREES F.

GAS-OIL RATIO, IS CUBIC FEET OF GAS AT 15.025 PSIA AND 60 DEGREES F, PER BARREL OF STOCK TANK OIL AT 60 DEGREES F.

NOTE: * INDICATES VALUE MEASURED @ 60°F

** BASED ON SEPARATOR WATER FLASH

ALSO BASED ON SEP. WATER FLASH:

SOLUTION GAS IN RES. FLD. IS

30.19 SCF DRY GAS/BBL. S.T. WATER @ 60°F

30.38 SCF WET GAS/BBL. S.T. WATER @ 60°F

REF. TO "OIL" ABOVE SHOULD READ "WATER"

TECHNADRIL-FENIX & SCISSON, INC.
GLADYS MCCALL WELL NO. 1, SAND 8
EAST CRAB LAKE FIELD

EFFECT OF GAS-WATER RATIO UPON BUBBLE POINT PRESSURES @ 290°F

GAS-WATER RATIO	BUBBLE POINT
(SCF SEP. GAS @ 15.025 PSIA 7 60°F)	
(BBL. SEP. WATER @ 500 PSIG & 268)	(PSIA)
-----	-----
-----	-----
~ 31.9 EXTRAPOLATED	12783 RES. PRESSURE
25.01 (PRODUCED)	9200
20.00	6730
18.00	5785
15.00	4550
10.00	2855

TECHNADRIL-FENIX & SCISSON, INC.
GLADYS MCCALL WELL NO. 1, SAND 8
EAST CRAB LAKE FIELD

SEPARATOR WATER FLASH TO 0 PSIG & 78°F

SOLUTION GAS-WATER RATIO, DRY = 3.75

, WET = 3.88

SCF GAS @ 15.025 PSIA & 60°F

BBL. WATER @ 0 PSIG & 60°F

SHRINKAGE = 0.9437

VOL. S.T. WATER @ 60°F

VOL. SEP. H2O @ 500 PSIG & 268°F

STOCK TANK WATER DENSITY = 1.0656 Gm/Ml. @ 60°F

GAS GRAVITY, DRY = 0.9729 (SEE ANALYSIS ON PAGE 15)

, WET = 0.9590

PRODUCED OCTOBER 8, 1983:

GWR = 26.44 + 3.75 = 30.19

SCF TOTAL DRY GAS @ 15.025 PSIA & 60°F

BBL. STOCK TANK WATER @ 60°F

GWR = 26.50 + 3.88 = 30.38

SCF TOTAL WET GAS @ 15.025 PSIA & 60°F

BBL. STOCK TANK WATER @ 60°F

Supp

TECHNADRIL-FENIX & SCISSON, INC.
GLADYS MCCALL WELL NO. 1, SAND 8
EAST CRAB LAKE FIELD

SEPARATOR GAS SAMPLED:
OCTOBER 8, 1983 @
500 PSIG & 97°F

CHROMATOGRAPHIC ANALYSIS

	DRY	WET
	MOLE %	

WATER		0.22 ± .04
CARBON DIOXIDE	10.63	10.61
NITROGEN	0.25	0.25
METHANE	85.96	85.77
ETHANE	2.34	2.33
PROPANE	0.52	0.52
ISO-BUTANE	0.09	0.09
N-BUTANE	0.07	0.07
ISO-PENTANE	0.02	0.02
N-PENTANE	0.01	0.01
HEXANES	0.00	0.00
HEPTANES PLUS	0.11	0.11
	-----	-----
TOTAL	100.00	100.00
GRAVITY (AIR = 1.00)	0.6813	0.6812

NOTE: WATER VAPOR MEASURED ON SITE, AVERAGE 5 RUNS.

TECHNADRIL-FENIX & SCISSON, INC.
GLADYS MCCALL WELL NO. 1, SAND 8
EAST CRAB LAKE FIELD

SOLUTION GAS FROM
SEPARATOR WATER FLASH
@ @ PSIG & 78°F
(CALCULATED NITROGEN FREE)

CHROMATOGRAPHIC ANALYSIS

	DRY	WET
	MOLE %	

WATER		3.24
CARBON DIOXIDE	39.89	38.60
NITROGEN	-----	-----
METHANE	57.73	55.86
ETHANE	1.39	1.34
PROPANE	0.19	0.18
ISO-BUTANE	0.02	0.02
N-BUTANE	0.02	0.02
ISO-PENTANE	0.00	0.00
N-PENTANE	0.00	0.00
HEXANES	0.00	0.00
HEPTANES PLUS	0.76	0.74
	-----	-----
TOTAL	100.00	100.00
GRAVITY (AIR = 1.00)	0.9729	0.9590

TECHNADRIL-FENIX & SCISSON, INC.
GLADYS MCCALL WELL NO. 1, SAND 8
EAST CRAB LAKE FIELD

SOLUTION GAS FROM
6000 PSIA SAMPLE -
DIFFERENTIAL LIBERATION
(CALCULATED NITROGEN FREE)

CHROMATOGRAPHIC ANALYSIS

	DRY	WET
	MOLE %	

WATER		1.86
CARBON DIOXIDE	4.20	4.12
NITROGEN	----	----
METHANE	89.03	87.37
ETHANE	4.34	4.26
PROPANE	1.53	1.50
ISO-BUTANE	0.22	0.22
N-BUTANE	0.18	0.18
ISO-PENTANE	0.08	0.08
N-PENTANE	0.04	0.04
HEXANES	0.00	0.00
HEPTANES PLUS	0.38	0.37
	-----	-----
TOTAL	100.00	100.00
GRAVITY (AIR = 1.00)	0.6513	0.6507

GAS DEVIATION FACTOR (Z) = 1.109 @ 6000 PSIA & 290°F
BBLs. GAS IN RES./MMSCF (Bg) = 713 @ 6000 PSIA & 290°F

TECHNADRIL-FENIX & SCISSON, INC.
GLADYS MCCALL WELL NO. 1, SAND 8
EAST CRAB LAKE FIELD

SOLUTION GAS FROM
4000 PSIA SAMPLE -
DIFFERENTIAL LIBERATION
(CALCULATED NITROGEN FREE)

CHROMATOGRAPHIC ANALYSIS

	DRY	WET
	MOLE %	

WATER		2.53
CARBON DIOXIDE	3.10	3.02
NITROGEN	----	----
METHANE	91.74	89.42
ETHANE	3.50	3.41
PROPANE	0.99	0.96
ISO-BUTANE	0.19	0.19
N-BUTANE	0.13	0.13
ISO-PENTANE	0.04	0.04
N-PENTANE	0.02	0.02
HEXANES	0.00	0.00
HEPTANES PLUS	0.29	0.28
	-----	-----
TOTAL	100.00	100.00
GRAVITY (AIR = 1.00)	0.6260	0.6259

GAS DEVIATION FACTOR (Z) = 0.997 @ 4000 PSIA & 290°F

BBLs. GAS IN RES./MMSCF (Bg) = 962 @ 4000 PSIA & 290°F

TECHNADRIL-FENIX & SCISSON, INC.
GLADYS MCCALL WELL NO. 1, SAND 8
EAST CRAB LAKE FIELD

SOLUTION GAS FROM
2000 PSIA SAMPLE -
DIFFERENTIAL LIBERATION
(CALCULATED NITROGEN FREE)

CHROMATOGRAPHIC ANALYSIS

	DRY	WET
	MOLE %	

WATER		3.75
CARBON DIOXIDE	3.87	3.72
NITROGEN	----	----
METHANE	92.34	88.87
ETHANE	2.75	2.65
PROPANE	0.63	0.61
ISO-BUTANE	0.10	0.10
N-BUTANE	0.08	0.08
ISO-PENTANE	0.02	0.02
N-PENTANE	0.01	0.01
HEXANES	0.00	0.00
HEPTANES PLUS	0.20	0.19
	-----	-----
TOTAL	100.00	100.00
GRAVITY (AIR = 1.00)	0.6206	0.6207

GAS DEVIATION FACTOR (Z) = 0.947 @ 2000 PSIA & 290°F

BBLs. GAS IN RES./MMSCF (Bg) = 1828 @ 2000 PSIA & 290°F

TECHNADRIL-FENIX & SCISSON, INC.
GLADYS MCCALL WELL NO. 1, SAND 8
EAST CRAB LAKE FIELD

SOLUTION GAS FROM
15 PSIA SAMPLE -
DIFFERENTIAL LIBERATION
(CALCULATED NITROGEN FREE)

CHROMATOGRAPHIC ANALYSIS

	DRY	WET
	MOLE %	

WATER		8.32
CARBON DIOXIDE	24.79	22.73
NITROGEN	----	----
METHANE	73.93	67.78
ETHANE	1.06	0.97
PROPANE	0.11	0.10
ISO-BUTANE	0.00	0.00
N-BUTANE	0.00	0.00
ISO-PENTANE	0.00	0.00
N-PENTANE	0.00	0.00
HEXANES	0.00	0.00
HEPTANES PLUS	0.11	0.10
	-----	-----
TOTAL	100.00	100.00
GRAVITY (AIR = 1.00)	0.8032	0.7881

GAS DEVIATION FACTOR (Z) = 1.000 @ 15 PSIA & 290°F

BBLs. GAS IN RES./MMSCF (Bg) = 256,893 @ 15.025 PSIA & 290°F

Company Technadril-Fenix & Scisson well Gladys McCall No. 1
Reservoir Sand 8 Field East Crab Lake

FIG. 1: Effect of Gas-Water Ratio on Bubble Point Pressure @ 290°F

Company	Technadril-Fenix & Scisson	Well Gladys McCall No. 1
Reservoir	Sand 8	Field East Crab Lake

FIG. 2: Liq. Vol. % vs. Pressure-Res. Water @ 290°F GWR = 25.01

Company Technadril-Fenix & Scisson
Reservoir

Well Gladys McCall No. 1
Field East Crab Lake

FIG: 3: Diff. Liberation of Reservoir Water @ 290°F GWR = 25.01

Company Technadril-Fenix & Scisson Well Gladys McCall No. 1
 Reservoir Field East Crab Lake

FIG: 4: FVF & Solution GWR of Saturated Water (Based on sep. water flash)@ 290°F

Company Technadril-Fenix & Scisson
Reservoir Sand 8

Well Gladys McCall No. 1
Field East Crab Lake

FIG: 5: Specific Volume of Saturated (Bubble Point) Water @ 290 F

Company Technadril-Fenix & Scisson Well Gladys McCall No. 1
Reservoir Sand 8 Field East Crab Lake

FIGURE 6: Viscosity of Reservoir Water @ 290°F GWR = 25.01

APPENDIX B

Gas Analysis by Sample Location

THIS IS CHOICE 1.

THIS GAS CAME DIRECTLY FROM THE TOP OF THE FIRST STAGE SEPARATOR AT THE GLADYS McCALL WELL.

RECORD NO.	NUMBERS IN RECORD	DATE	TIME ¹	TEMP, F	PRESS, PSIA	GRAVITY ² AIR=1	GROSS HEATING ² VALUE, BTU/CF	LAB ³ NO.	CC2	N2	C1	C2	C3	iC4	nC4	iC5	nC5	C6+	TOTAL	
---	----	-----	-----	---	----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
1	1-17	9 Feb 1986	14:45	285	1024	.6536	969	1	7.75	.20	88.78	2.41	.55	.09	.08	.02	0.00	.12	100.00	MOL%
1	18-25											.657	.154	.030	.026	.007	0.000	.050	.925	GPMP
2	1-17	9 Feb 1986	19:15	285	1025	.6528	969	1	7.68	.24	88.84	2.39	.55	.08	.08	.02	0.00	.12	100.00	MOL%
2	18-25											.652	.154	.027	.026	.007	0.000	.050	.916	GPMP
3	1-17	10 Feb 1986	13:05	294	1015	.6562	973	1	7.74	.24	88.64	2.41	.56	.09	.08	.02	.01	.21	100.00	MOL%
3	18-25											.657	.157	.030	.026	.007	.004	.088	.949	GPMP
4	1-17	11 Feb 1986	10:31	306	1020	.6586	976	1	7.78	.23	88.52	2.42	.56	.09	.07	.02	.01	.30	100.00	MOL%
4	18-25											.660	.157	.030	.022	.007	.004	.126	1.006	GPMP
5	1-17	11 Feb 1986	11:11	289	1022	.6626	977	1	8.00	.22	88.07	2.54	.63	.12	.10	.03	.01	.28	100.00	MOL%
5	18-25											.692	.177	.040	.032	.011	.004	.117	1.074	GPMP
6	1-17	11 Feb 1986	11:32	291	1019	.6629	977	1	8.01	.23	88.12	2.46	.61	.11	.10	.04	.01	.31	100.00	MOL%
6	18-25											.571	.171	.037	.032	.015	.004	.130	1.059	GPMP
7	1-17	11 Feb 1986	12:21	294	1020	.6584	972	1	7.91	.22	88.37	2.48	.60	.11	.09	.03	.01	.18	100.00	MOL%
7	18-25											.576	.169	.037	.029	.011	.004	.075	1.001	GPMP
8	1-17	11 Feb 1986	14:25	302	1016	.6537	968	1	7.81	.22	88.74	2.40	.54	.09	.07	.02	.01	.10	100.00	MOL%
8	18-25											.654	.152	.030	.022	.007	.004	.042	.911	GPMP
9	1-17	13 Apr 1987	08:43	284	1013	.6551	963	1	8.07	.24	88.50	2.42	.53	.08	.07	.02	.02	.35	100.00	MOL%
9	18-25											.569	.149	.027	.022	.007	.007	.021	.894	GPMP
10	1-17	13 Apr 1987	16:00	284	515	.6856	929	1	11.31	.23	85.43	2.31	.49	.07	.05	.02	.01	.08	100.00	MOL%
10	18-25											.630	.138	.023	.016	.007	.004	.034	.831	GPMP
11	1-17	14 Apr 1987	07:50	280	515	.6523	931	1	10.99	.27	85.77	2.26	.47	.07	.06	.02	.02	.07	100.00	MOL%
11	18-25											.616	.132	.023	.019	.007	.007	.029	.835	GPMP
12	1-17	14 Apr 1987	12:30	280	515	.6853	935	1	11.05	.25	85.52	2.34	.52	.09	.06	.02	.02	.11	100.00	MOL%
12	18-25											.638	.146	.030	.025	.007	.007	.042	.901	GPMP

¹ TIME OF 12:00 WAS ENTERED IF CORRECT TIME WAS NOT KNOWN.

(6X10CPBAS)

² DRY GAS AT 14.73 PSIA AND 60 DEG F. (ASTM D 3596-77). GPM's ARE FOR GAS AT 15.025 PSIA.

³ LAB 1 IS INSTITUTE OF GAS TECHNOLOGY; LAB 2 IS WEATHERLY LABORATORIES, INC.; LAB 3 IS PETROLEUM ANALYST INC.

THIS IS CHOICE 1.

THIS GAS CAME DIRECTLY FROM THE TOP OF THE FIRST STAGE SEPARATOR AT THE GLADYS McCALL WELL.

RECORD NO.	NUMBERS IN RECORD	DATE	TIME ¹	TEMP, F	PRESS, PSIA	GRAVITY ² AIR=1	GROSS HEATING ² VALUE, BTU/CF	LAB ³ NO.	CO2	N2	O1	O2	O3	IC4	IC4	IC5	IC5	IC6+	TOTAL	
---	-----	-----	-----	---	----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
13	1-17	14 Apr 1987	12:40	280	515	.6829	933	1	10.97	.25	85.73	2.28	.50	.08	.07	.03	.02	.07	100.00	MOLEX
13	18-25											.622	.140	.027	.022	.011	.007	.029	.859	GPMP
14	1-17	14 Apr 1987	13:35	280	516	.6858	932	1	11.19	.23	85.49	2.30	.49	.07	.07	.03	.02	.11	100.00	MOLEX
14	18-25											.627	.138	.023	.022	.011	.007	.046	.875	GPMP

¹ TIME OF 12:00 WAS ENTERED IF CORRECT TIME WAS NOT KNOWN.

[GMITOPGAS]

² DRY GAS AT 14.73 PSIA AND 60 DEG F. (ASTM D 3582-77). GPM's ARE FOR GAS AT 15.025 PSIA.

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THIS IS CHOICE 2.

THIS GAS CAME THROUGH SS TUBING CONNECTED TO THE HORIZONTAL RUN BETWEEN THE FIRST STAGE SEPARATOR AND THE COOLER AT THE GLADYS McCALL.

RECORD NO.	NUMBERS IN RECORD	DATE	TIME ¹	TEMP, F	PRESS, PSIA	GRAVITY ² AIR=1	GROSS HEATING ² VALUE, BTU/CF	LAB ³ NO.	CO2	N2	C1	C2	C3	iC4	nC4	iC5	nC5	C6+	TOTAL	
---	-----	-----	-----	---	----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
1	1-17	17 Dec 1985	17:10	91	1019	.6549	967	1	7.88	.25	88.60	2.42	.55	.09	.07	.01	.02	.11	100.00	MDLZ
1	18-25											.660	.154	.030	.022	.004	.007	.046	.924	GPM ²
2	1-17	18 Dec 1985	09:30	90	1018	.6550	966	1	8.00	.17	88.59	2.43	.54	.09	.07	.02	.01	.08	100.00	MDLZ
2	18-25											.663	.152	.030	.022	.007	.004	.034	.911	GPM ²
3	1-17	15 Jan 1986	07:00	225	1015	.6558	968	1	7.86	.31	86.47	2.44	.61	.09	.08	.02	.01	.11	100.00	MDLZ
3	18-25											.665	.171	.030	.026	.007	.004	.046	.949	GPM ²
4	1-17	7 Feb 1986	21:15	208	518	.6642	951	1	9.11	.26	87.68	2.23	.47	.07	.06	.02	.01	.09	100.00	MDLZ
4	18-25											.608	.132	.023	.019	.007	.004	.038	.831	GPM ²
5	1-17	7 Feb 1986	21:15	208	518	.6650	952	1	9.14	.20	87.66	2.24	.49	.07	.06	.01	.02	.11	100.00	MDLZ
5	18-25											.611	.138	.023	.019	.004	.007	.046	.848	GPM ²
6	1-17	8 Feb 1986	06:45	260	1024	.6500	972	1	7.39	.23	89.16	2.38	.53	.08	.07	.02	.01	.13	100.00	MDLZ
6	18-25											.649	.149	.027	.022	.007	.004	.055	.912	GPM ²
7	1-17	8 Feb 1986	12:44	280	1021	.6547	970	1	7.79	.23	88.69	2.41	.54	.09	.08	.02	0.00	.15	100.00	MDLZ
7	18-25											.657	.152	.030	.026	.007	0.000	.063	.935	GPM ²
8	1-17	10 Feb 1986	13:10	294	1015	.6526	968	1	7.75	.21	88.84	2.39	.53	.09	.07	.02	.02	.08	100.00	MDLZ
8	18-25											.652	.149	.030	.022	.007	.007	.034	.901	GPM ²
9	1-17	12 Feb 1986	15:05	297	1020	.6554	968	1	7.88	.25	88.59	2.42	.53	.09	.08	.02	.01	.13	100.00	MDLZ
9	18-25											.660	.149	.030	.026	.007	.004	.055	.930	GPM ²
10	1-17	12 Feb 1986	19:00	298	1024	.6532	966	1	7.77	.25	88.74	2.43	.53	.09	.07	.02	.01	.09	100.00	MDLZ
10	18-25											.663	.149	.030	.022	.007	.004	.038	.913	GPM ²

¹ TIME OF 12:00 WAS ENTERED IF CORRECT TIME WAS NOT KNOWN.

[GPM:KELYGAS]

² DRY GAS AT 14.73 PSIA AND 60 DEG F. (ASTM D 3588-77). GPM's ARE FOR GAS AT 15.025 PSIA.

³ LAB 1 IS INSTITUTE OF GAS TECHNOLOGY; LAB 2 IS WEATHERLY LABORATORIES, INC.; LAB 3 IS PETROLEUM ANALYST INC.

THIS IS CHOICE 4.

THIS GAS CAME FROM EITHER THE DRAGER SAMPLING POINT OR THE METER RUN AFTER THE COOLER AT THE GLADYS McCALL WELL.

RECORD NO.	NUMBERS IN RECORD	DATE	TIME ¹	TEMP, F	PRESS, PSIA	GRAVITY ² AIR=1	GROSS HEATING ² VALUE, BTU/CF	LAB ³ NO.	CO2	N2	C1	C2	C3	iC4	nC4	iC5	nC5	C6+	TOTAL	
---	-----	-----	----	---	----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
1	1-17	8 Oct 1983	12:00	97	500	.6809	938	2	10.63	.25	85.96	2.34	.52	.09	.07	.02	.01	.11	100.00	MDLZ
1	18-25											.638	.146	.030	.022	.007	.004	.046	.894	6PM ²
2	1-17	28 Oct 1983	12:00	275	515	.7136	997	2	10.31	.24	84.85	2.31	.51	.09	.08	.02	.01	1.58	100.00	MDLZ
2	18-25											.630	.143	.030	.026	.007	.004	.663	1.502	6PM ²
3	1-17	14 Jan 1984	12:00	227	769	.6728	965	2	9.09	.25	87.14	2.41	.55	.10	.08	.02	.01	.35	100.00	MDLZ
3	18-25											.657	.154	.033	.026	.007	.004	.147	1.028	6PM ²
4	1-17	18 Jan 1984	14:00	100	765	.6660	1012	2	6.80	.26	88.76	2.44	.55	.10	.06	.03	.02	.96	100.00	MDLZ
4	18-25											.665	.154	.033	.026	.011	.007	.403	1.300	6PM ²
5	1-17	24 Jan 1984	12:00	110	1015	.6589	973	2	7.89	.26	88.35	2.48	.57	.10	.09	.02	.01	.23	100.00	MDLZ
5	18-25											.676	.160	.033	.029	.007	.004	.096	1.006	6PM ²
6	1-17	26 Jan 1984	12:00	100	1021	.6559	970	2	7.81	.26	88.52	2.48	.57	.10	.09	.03	.01	.13	100.00	MDLZ
6	18-25											.676	.160	.033	.029	.011	.004	.055	.968	6PM ²
7	1-17	27 Jan 1984	12:00	245	1016	.6561	970	2	7.83	.27	88.51	2.47	.56	.10	.08	.02	.01	.15	100.00	MDLZ
7	18-25											.673	.157	.033	.026	.007	.004	.063	.964	6PM ²
8	1-17	7 Feb 1984	12:00	88	1015	.6561	971	2	7.77	.28	88.54	2.47	.56	.10	.08	.02	.01	.17	100.00	MDLZ
8	18-25											.673	.157	.033	.026	.007	.004	.071	.972	6PM ²
9	1-17	9 Feb 1984	12:00	93	1015	.6530	979	2	7.29	.27	88.95	2.48	.57	.10	.08	.02	.02	.22	100.00	MDLZ
9	18-25											.676	.160	.033	.026	.007	.007	.092	1.002	6PM ²
10	1-17	29 Feb 1984	11:00	88	324	.7021	918	2	12.74	.24	83.92	2.25	.49	.08	.07	.02	.01	.18	100.00	MDLZ
10	18-25											.613	.138	.027	.022	.007	.004	.075	.867	6PM ²
11	1-17	3 Mar 1984	10:00	92	419	.6911	930	2	11.61	.24	85.03	2.27	.50	.08	.07	.02	.01	.17	100.00	MDLZ
11	18-25											.619	.140	.027	.022	.007	.004	.071	.891	6PM ²
12	1-17	4 Jun 1984	12:00	102	1005	.6595	967	2	8.15	.27	85.20	2.44	.56	.10	.08	.03	.02	.15	100.00	MDLZ
12	18-25											.665	.157	.033	.026	.011	.007	.063	.963	6PM ²

¹ TIME OF 12:00 WAS ENTERED IF CORRECT TIME WAS NOT KNOWN.

(GMINETBAGS)

² DRY GAS AT 14.73 PSIA AND 60 DEG F. (ASTM D 3588-77). GPM's ARE FOR GAS AT 15.025 PSIA.

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THIS IS CHOICE 4.

THIS GAS CAME FROM EITHER THE DRAGER SAMPLING POINT OR THE METER RUN AFTER THE COOLER AT THE GLADYS McALL WELL.

RECORD NO.	NUMBERS IN RECORD	DATE	TIME	TEMP, F	FRESS, PSIA	GRAVITY ² AIR=1	GROSS HEATING ² VALUE, BTU/CF	LAB ³ NO.	C02	N2	C1	C2	C3	IC4	nC4	IC5	nC5	C6+	TOTAL	
---	-----	-----	-----	---	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
13	1-17	29 Jun 1984	12:00	78	945	.6532	966	2	7.82	.26	88.66	2.45	.56	.10	.08	.02	.01	.04	100.00	MDLX
13	18-25											.669	.157	.033	.026	.007	.004	.017	.912	GPM ²
14	1-17	4 Jun 1984	12:00	105	957	.6595	966	2	6.14	.27	88.23	2.46	.57	.10	.08	.02	.01	.12	100.00	MDLX
14	18-25											.671	.160	.033	.026	.007	.004	.050	.951	GPM ²
15	1-17	18 Jul 1984	14:00	97	1015	.6552	970	2	7.80	.25	88.59	2.46	.56	.10	.08	.02	.01	.13	100.00	MDLX
15	18-25											.671	.157	.033	.026	.007	.004	.055	.953	GPM ²
16	1-17	20 Jul 1984	12:00	95	1015	.6551	969	2	7.83	.26	88.57	2.46	.56	.10	.08	.02	.01	.11	100.00	MDLX
16	18-25											.671	.157	.033	.026	.007	.004	.046	.944	GPM ²
17	1-17	22 Jul 1984	12:00	101	995	.6710	949	2	9.31	.69	86.70	2.45	.53	.09	.07	.02	.01	.13	100.00	MDLX
17	18-25											.668	.149	.030	.022	.007	.004	.055	.935	GPM ²
18	1-17	24 Jul 1984	12:00	94	1018	.6560	970	2	7.82	.27	88.53	2.46	.56	.10	.08	.02	.01	.15	100.00	MDLX
18	18-25											.671	.157	.033	.026	.007	.004	.063	.961	GPM ²
19	1-17	26 Jul 1984	12:00	82	1020	.6560	969	2	7.88	.26	88.50	2.46	.56	.10	.08	.02	.01	.13	100.00	MDLX
19	18-25											.671	.157	.033	.026	.007	.004	.055	.953	GPM ²
20	1-17	22 Aug 1984	12:00	87	940	.6742	944	2	9.99	.30	86.56	2.33	.52	.09	.07	.02	.01	.11	100.00	MDLX
20	18-25											.635	.146	.030	.022	.007	.004	.046	.691	GPM ²
21	1-17	12 Oct 1984	12:10	87	1039	.6562	968	2	7.89	.31	88.44	2.47	.56	.10	.08	.02	.01	.12	100.00	MDLX
21	18-25											.673	.157	.033	.026	.007	.004	.050	.951	GPM ²
22	1-17	6 Dec 1984	12:00	210	1031	.6550	976	2	7.54	.28	83.71	2.46	.57	.10	.08	.02	.01	.21	100.00	MDLX
22	18-25											.676	.160	.033	.026	.007	.004	.088	.994	GPM ²
23	1-17	6 Dec 1984	12:00	72	1010	.6686	954	2	9.24	.27	87.34	2.28	.51	.08	.07	.03	.02	.16	100.00	MDLX
23	18-25											.622	.143	.027	.022	.011	.007	.067	.900	GPM ²
24	1-17	28 Feb 1985	12:00	80	1024	.6566	971	2	7.81	.27	88.46	2.49	.59	.11	.09	.02	.02	.14	100.00	MDLX
24	18-25											.679	.166	.037	.029	.007	.007	.059	.984	GPM ²

¹ TIME OF 12:00 WAS ENTERED IF CORRECT TIME WAS NOT KNOWN.

[GMINETFBAS]

² DRY GAS AT 14.73 PSIA AND 60 DEG F. (ASTM D 3569-77). GPM's ARE FOR GAS AT 15.025 PSIA.

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THIS IS CHOICE 4.

THIS GAS CAME FROM EITHER THE DRAGER SAMPLING POINT OR THE METER RUN AFTER THE COOLER AT THE GLADYS McCALL WELL.

RECORD NO.	NUMBERS IN RECORD	DATE	TIME ¹	TEMP, F	PRESS, PSIA	GRAVITY ² AIR=1	GROSS HEATING ³ VALUE, BTU/CF	LAB ³ NO.	CO2	N2	C1	C2	C3	iC4	nC4	iC5	nC5	C6+	TOTAL	
---	-----	-----	-----	---	----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
25	1-17	15 Jan 1986	06:00	88	1015	.6501	971	1	7.42	.27	89.07	2.41	.55	.09	.07	.01	.01	.10	100.00	MGLX
25	18-25											.657	.154	.030	.022	.004	.004	.042	.913	GPM ²
26	1-17	9 Feb 1986	14:50	285	1025	.6530	970	1	7.70	.21	88.84	2.40	.54	.10	.08	0.00	0.00	.13	100.00	MGLX
26	18-25											.654	.152	.033	.026	0.000	0.000	.055	.919	GPM ²
27	1-17	9 Feb 1986	19:21	285	1025	.6545	971	1	7.73	.24	88.70	2.42	.57	.10	.08	.01	0.00	.15	100.00	MGLX
27	18-25											.660	.160	.033	.026	.004	0.000	.063	.945	GPM ²
28	1-17	10 Feb 1986	13:18	293	1016	.6563	972	1	7.80	.23	88.52	2.47	.60	.11	.09	.03	.02	.13	100.00	MGLX
28	18-25											.673	.168	.037	.029	.011	.007	.055	.981	GPM ²
29	1-17	12 Feb 1986	11:10	295	1035	.6556	968	1	7.88	.26	89.55	2.43	.55	.09	.08	.02	.01	.13	100.00	MGLX
29	18-25											.663	.154	.030	.026	.007	.004	.055	.938	GPM ²
30	1-17	19 Feb 1987	10:50	90	1015	.6559	968	1	7.91	.25	88.57	2.40	.53	.08	.07	.02	.02	.15	100.00	MGLX
30	18-25											.654	.149	.027	.022	.007	.007	.063	.930	GPM ²
31	1-17	13 Apr 1987	12:30	95	1013	.6564	962	1	8.17	.25	88.36	2.44	.54	.08	.07	.02	.01	.06	100.00	MGLX
31	18-25											.665	.152	.027	.022	.007	.004	.025	.902	GPM ²
32	1-17	13 Apr 1987	17:10	83	514	.6825	930	1	11.06	.23	85.75	2.26	.48	.07	.06	.01	.02	.06	100.00	MGLX
32	18-25											.616	.135	.023	.019	.004	.007	.025	.636	GPM ²
33	1-17	13 Apr 1987	18:20	79	515	.6830	930	1	11.11	.23	85.69	2.28	.49	.07	.03	.02	.01	.07	100.00	MGLX
33	18-25											.622	.138	.023	.010	.007	.004	.029	.833	GPM ²
34	1-17	14 Apr 1987	07:25	80	515	.6812	933	1	10.87	.22	85.95	2.23	.47	.07	.08	.02	.01	.08	100.00	MGLX
34	18-25											.608	.132	.023	.026	.007	.004	.034	.834	GPM ²
35	1-17	14 Apr 1987	14:50	91	517	.6847	931	1	11.17	.23	85.55	2.30	.49	.07	.07	.02	.01	.09	100.00	MGLX
35	18-25											.627	.138	.023	.022	.007	.004	.038	.859	GPM ²
36	1-17	14 Apr 1987	22:00	85	519	.6826	932	1	11.01	.25	85.75	2.27	.48	.07	.06	.02	.02	.07	100.00	MGLX
36	18-25											.619	.135	.023	.019	.007	.007	.029	.840	GPM ²

¹ TIME OF 12:00 WAS ENTERED IF CORRECT TIME WAS NOT KNOWN.

[GMMETAGAS]

² DRY GAS AT 14.73 PSIA AND 60 DEG F. (ASTM D 3598-77). GPM's ARE FOR GAS AT 15.025 PSIA.

³ LAB 1 IS INSTITUTE OF GAS TECHNOLOGY; LAB 2 IS WEATHERLY LABORATORIES, INC.; LAB 3 IS PETROLEUM ANALYST INC.

THIS IS CHOICE 4.

THIS GAS CAME FROM EITHER THE DRAGER SAMPLING POINT OR THE METER RUN AFTER THE COOLER AT THE GLADYS McCALL WELL.

RECORD NO.	NUMBERS IN RECORD	DATE	TIME*	TEMP, F	PRESS, PSIA	GRAVITY* AIR=1	GROSS HEATING* VALUE, BTU/CF	LAB* NO.	CO2	N2	C1	C2	C3	iC4	nC4	iC5	nC5	C6+	TOTAL
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37	1-17	15 Apr 1987	06:25	73	515	.6829	931	1	11.09	.22	85.70	2.29	.49	.07	.06	0.00	0.00	.08	100.00 MDLZ
37	18-25											.624	.138	.023	.019	0.000	0.000	.034	.338 GPM ²
38	1-17	20 Apr 1987	16:50	78	1015	.6554	963	1	8.07	.25	88.47	2.42	.54	.08	.08	.02	.02	.05	100.00 MDLZ
38	18-25											.666	.152	.027	.026	.007	.007	.021	.900 GPM ²
39	1-17	27 Apr 1987	09:45	100	1020	.6561	964	1	6.09	.24	88.42	2.44	.55	.08	.07	.02	.02	.07	100.00 MDLZ
39	18-25											.665	.154	.027	.022	.007	.007	.029	.913 GPM ²

* TIME OF 12:00 WAS ENTERED IF CORRECT TIME WAS NOT KNOWN.

[GMMETR GAS]

* DRY GAS AT 14.73 PSIA AND 60 DEG F. (ASTM D 3588-77). GPM's ARE FOR GAS AT 15.025 PSIA.

* LAB 1 IS INSTITUTE OF GAS TECHNOLOGY; LAB 2 IS WEATHERLY LABORATORIES, INC.; LAB 3 IS PETROLEUM ANALYST INC.

THIS IS CHOICE 5.

THIS GAS WAS RELEASED WHEN THE PRESSURE ON GLADYS McCALL FIRST STAGE SEPARATOR BRAINE WAS REDUCED TO ONE ATMOSPHERE.

RECORD NO.	NUMBERS IN RECORD	DATE	TIME ¹	TEMP, F	PRESS, PSIA	GRAVITY ² AIR=1	GROSS HEATING ² VALUE, BTU/CF	LAB ³ NO.	CO2	N2	C1	C2	C3	iC4	nC4	iC5	nC5	C6+	TOTAL	
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1	1-17	8 Oct 1983	12:00	97	500	.9691	653	2	39.89	0.00	57.73	1.39	.19	.02	.02	0.00	0.00	.76	100.00	MDLZ
1	18-25											.379	.053	.007	.006	0.000	0.000	.319	.754	GPM ²
2	1-17	28 Oct 1983	12:00	275	515	.9700	633	2	40.74	0.00	57.21	1.35	.19	.02	.02	0.00	0.00	.47	100.00	MDLZ
2	18-25											.368	.053	.007	.006	0.000	0.000	.197	.632	GPM ²
3	1-17	14 Jan 1984	12:00	227	769	.9065	703	2	34.05	0.00	63.44	1.62	.46	.07	.03	.04	0.00	.29	100.00	MDLZ
3	18-25											.442	.129	.023	.010	.015	0.000	.122	.740	GPM ²
4	1-17	18 Jan 1984	14:00	275	765	.8875	705	2	32.79	0.00	65.18	1.51	.29	.04	.03	.01	.01	.14	100.00	MDLZ
4	18-25											.412	.081	.013	.010	.004	.004	.059	.582	GPM ²
5	1-17	24 Jan 1984	12:00	275	1015	.8143	775	2	25.53	0.00	72.62	1.52	.19	.02	.02	0.00	0.00	.10	100.00	MDLZ
5	18-25											.414	.053	.007	.006	0.000	0.000	.042	.523	GPM ²
6	1-17	26 Jan 1984	12:00	276	1021	.8695	724	2	30.95	0.00	66.95	1.56	.36	.05	.02	0.00	0.00	.11	100.00	MDLZ
6	18-25											.425	.101	.017	.006	0.000	0.000	.046	.595	GPM ²
7	1-17	27 Jan 1984	12:00	276	1016	.8663	721	2	30.87	0.00	67.36	1.41	.19	.02	.02	0.00	0.00	.13	100.00	MDLZ
7	18-25											.384	.053	.007	.006	0.000	0.000	.055	.505	GPM ²
8	1-17	7 Feb 1984	10:30	282	1015	.9003	687	2	34.30	0.00	63.94	1.36	.19	.02	.02	0.00	0.00	.17	100.00	MDLZ
8	18-25											.371	.053	.007	.006	0.000	0.000	.071	.508	GPM ²
9	1-17	28 Feb 1984	12:00	277	324	.8639	724	2	30.59	0.00	67.53	1.49	.22	.03	.03	.02	.01	.08	100.00	MDLZ
9	18-25											.406	.062	.010	.010	.007	.004	.034	.552	GPM ²
10	1-17	3 Mar 1984	10:00	277	419	.8142	776	2	25.47	0.00	72.58	1.59	.23	.02	.02	0.00	0.00	.09	100.00	MDLZ
10	18-25											.433	.065	.007	.006	0.000	0.000	.038	.549	GPM ²
11	1-17	18 Jul 1984	12:00	97	1015	.8862	676	2	33.88	0.00	65.78	.22	.02	0.00	0.00	0.00	.08	.02	100.00	MDLZ
11	18-25											.060	.006	0.000	0.000	0.000	.030	.008	.104	GPM ²
12	1-17	20 Jul 1984	12:00	95	1015	.8845	696	2	32.97	0.00	65.25	1.55	.18	.01	.01	0.00	0.00	.03	100.00	MDLZ
12	18-25											.423	.051	.003	.003	0.000	0.000	.013	.492	GPM ²

¹ TIME OF 12:00 WAS ENTERED IF CORRECT TIME WAS NOT KNOWN.

(SMIFLSHES)

² DRY GAS AT 14.73 PSIA AND 60 DEG F. (ASTM D 3588-77). GPM's ARE FOR GAS AT 15.025 PSIA.

³ LAB 1 IS INSTITUTE OF GAS TECHNOLOGY; LAB 2 IS WEATHERLY LABORATORIES, INC.; LAB 3 IS PETROLEUM ANALYST INC.

THIS IS CHOICE 5.

THIS GAS WAS RELEASED WHEN THE PRESSURE ON GLADYS McCALL FIRST STAGE SEPARATOR BRINE WAS REDUCED TO ONE ATMOSPHERE.

RECORD NO.	NUMBERS IN RECORD	DATE	TIME ¹	TEMP, F	PRESS, PSIA	GRAVITY ² AIR=1	GROSS HEATING ² VALUE, BTU/CF	LAB ³ NO.	CO2	N2	C1	C2	C3	iC4	nC4	iC5	nC5	C6+	TOTAL	
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13	1-17	24 Jul 1984	12:00	94	1018	.9022	679	2	34.76	0.00	63.66	1.29	.16	.01	.02	0.00	.01	.09	100.00	MDLZ
13	18-25											.352	.045	.003	.006	0.000	.004	.038	.448	GPM ²
14	1-17	26 Jul 1984	12:00	82	1020	.8849	708	2	32.53	0.00	65.60	1.39	.20	.02	.02	.03	.01	.20	100.00	MDLZ
14	18-25											.379	.056	.007	.006	.011	.004	.064	.547	GPM ²
15	1-17	7 Feb 1986	21:10	208	518	.8560	727	1	29.99	0.00	66.37	1.36	.17	.01	.01	.01	0.00	.08	100.00	MDLZ
15	18-25											.371	.048	.003	.003	.004	0.000	.034	.462	GPM ²
16	1-17	8 Feb 1986	08:54	264	1031	.8416	743	1	28.47	0.00	69.85	1.38	.18	.02	.01	0.00	0.00	.09	100.00	MDLZ
16	18-25											.376	.051	.007	.003	0.000	0.000	.038	.474	GPM ²
17	1-17	8 Feb 1986	12:40	280	1023	.8471	738	1	28.99	0.00	69.31	1.38	.18	.02	.02	0.00	0.00	.10	100.00	MDLZ
17	18-25											.376	.051	.007	.006	0.000	0.000	.042	.482	GPM ²
18	1-17	10 Feb 1986	13:25	295	1017	.7941	794	1	23.50	0.00	74.69	1.49	.20	.02	.02	.01	0.00	.07	100.00	MDLZ
18	18-25											.406	.056	.007	.006	.034	0.000	.029	.509	GPM ²
19	1-17	10 Feb 1986	16:00	298	1014	.8088	779	1	25.00	0.00	73.20	1.47	.20	.02	.02	0.00	0.00	.09	100.00	MDLZ
19	18-25											.401	.056	.007	.006	0.000	0.000	.038	.508	GPM ²
20	1-17	11 Feb 1986	10:34	306	1020	.8380	750	1	27.98	0.00	70.27	1.40	.19	.02	.02	0.00	0.00	.12	100.00	MDLZ
20	18-25											.382	.053	.007	.006	0.000	0.000	.050	.498	GPM ²
21	1-17	11 Feb 1986	11:14	289	1022	.8185	770	1	25.98	0.00	72.25	1.43	.19	.02	.02	0.00	0.00	.11	100.00	MDLZ
21	18-25											.390	.053	.007	.006	0.000	0.000	.046	.532	GPM ²
22	1-17	11 Feb 1986	11:38	291	1019	.8174	771	1	25.87	0.00	72.36	1.43	.19	.02	.02	0.00	0.00	.11	100.00	MDLZ
22	18-25											.390	.053	.007	.006	0.000	0.000	.046	.502	GPM ²
23	1-17	11 Feb 1986	12:24	294	1020	.8191	769	1	26.04	0.00	72.19	1.43	.19	.02	.02	0.00	0.00	.11	100.00	MDLZ
23	18-25											.390	.053	.007	.006	0.000	0.000	.046	.532	GPM ²
24	1-17	11 Feb 1986	14:30	302	1018	.8316	757	1	27.31	0.00	70.92	1.41	.20	.02	.02	0.00	0.00	.12	100.00	MDLZ
24	18-25											.384	.056	.007	.006	0.000	0.000	.050	.504	GPM ²

¹ TIME OF 12:00 WAS ENTERED IF CORRECT TIME WAS NOT KNOWN.

[GMI/FLSH/GAS]

² DRY GAS AT 14.73 PSIA AND 60 DEG F. (ASTM D 3586-77). GPM's ARE FOR GAS AT 15.025 PSIA.

³ LAB 1 IS INSTITUTE OF GAS TECHNOLOGY; LAB 2 IS WEATHERLY LABORATORIES, INC.; LAB 3 IS PETROLEUM ANALYST INC.

THIS IS CHOICE 5.

THIS GAS WAS RELEASED WHEN THE PRESSURE ON GLADYS McCALL FIRST STAGE SEPARATOR BRINE WAS REDUCED TO ONE ATMOSPHERE.

RECORD NO.	NUMBERS IN RECORD	DATE	TIME	TEMP, F	PRESS, PSIA	GRAVITY ² AIR=1	GROSS HEATING ² VALUE, BTU/CF	LAB ³ NO.	CO2	N2	C1	C2	C3	iC4	nC4	iC5	nC5	C6+	TOTAL
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25	1-17	14 Apr 1987	10:30	280	515	.8662	714	1	30.46	1.02	66.72	1.45	.21	.02	.02	0.00	0.00	.10	100.00 MDLZ
25	18-25											.395	.059	.007	.006	0.000	0.000	.042	.509 GPM ²
26	1-17	14 Apr 1987	15:20	280	516	.8501	734	1	28.90	.66	68.58	1.49	.22	.02	.02	0.00	0.00	.11	100.00 MDLZ
26	18-25											.406	.062	.007	.006	0.000	0.000	.046	.527 GPM ²
27	1-17	14 Apr 1987	22:30	285	519	.8431	740	1	28.36	.50	69.36	1.46	.20	.02	.02	0.00	0.00	.08	100.00 MDLZ
27	18-25											.398	.056	.007	.006	0.000	0.000	.034	.501 GPM ²
28	1-17	15 Apr 1987	07:10	285	515	.8537	728	1	29.34	.70	68.20	1.43	.19	.02	.02	0.00	0.00	.10	100.00 MDLZ
28	18-25											.390	.053	.007	.006	0.000	0.000	.042	.498 GPM ²
29	1-17	20 Apr 1987	17:40	284	1015	.8683	712	1	31.01	.50	66.79	1.38	.22	.01	.01	0.00	0.00	.08	100.00 MDLZ
29	18-25											.376	.062	.003	.003	0.000	0.000	.034	.478 GPM ²

¹ TIME OF 12:00 WAS ENTERED IF CORRECT TIME WAS NOT KNOWN.

[GM1FLSHGAS]

² DRY GAS AT 14.73 PSIA AND 60 DEG F. (ASTM D 3588-77). GPM's ARE FOR GAS AT 15.025 PSIA.

³ LAB 1 IS INSTITUTE OF GAS TECHNOLOGY; LAB 2 IS WEATHERLY LABORATORIES, INC.; LAB 3 IS PETROLEUM ANALYST INC.

THIS IS CHOICE 7.

THIS GAS CAME FROM THE DRAGER SAMPLING POINT WHICH IS CONNECTED TO THE TOP OF THE SECOND STAGE SEPARATOR AT THE BLADYS McCALL WELL.

RECORD NO.	NUMBERS IN RECORD	DATE	TIME*	TEMP, F	PRESS, PSIA	GRAVITY* AIR=1	GROSS HEATING* VALUE, BTU/CF	LAB* NO.	CO2	N2	O1	O2	O3	OC4	OC4	OC5	OC5	OC6+	TOTAL	
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1	1-17	14 Jan 1984	16:00	226	340	.7621	858	2	18.89	.16	78.33	1.81	.28	.03	.03	.03	.01	.43	100.00	MDLZ
1	18-25											.493	.079	.010	.010	.011	.004	.180	.787	GPM ²
2	1-17	24 Jan 1984	12:00	220	515	.7053	904	2	13.54	.19	83.74	1.94	.31	.04	.03	0.00	0.00	.21	100.00	MDLZ
2	18-25											.529	.087	.013	.010	0.000	0.000	.086	.727	GPM ²
3	1-17	26 Jan 1984	12:00	230	425	.7275	884	2	15.73	.18	81.61	1.85	.28	.03	.03	0.00	.01	.28	100.00	MDLZ
3	18-25											.504	.079	.010	.010	0.000	.004	.117	.724	GPM ²
4	1-17	27 Jan 1984	12:00	250	319	.7575	849	2	18.95	.16	78.55	1.75	.26	.03	.02	.01	0.00	.27	100.00	MDLZ
4	18-25											.477	.073	.010	.006	.004	0.000	.113	.683	GPM ²
5	1-17	7 Feb 1984	12:30	166	418	.7244	881	2	15.67	.12	81.88	1.78	.28	.03	.03	0.00	0.00	.21	100.00	MDLZ
5	18-25											.485	.079	.010	.010	0.000	0.000	.088	.672	GPM ²
6	1-17	9 Feb 1984	12:00	252	315	.7412	866	2	17.26	.18	80.23	1.74	.26	.03	.02	0.00	0.00	.26	100.00	MDLZ
6	18-25											.474	.073	.010	.006	0.000	0.000	.117	.681	GPM ²
7	1-17	18 Jul 1984	14:00	223	515	.7033	905	2	13.40	.19	83.93	1.91	.31	.03	.03	0.00	.02	.18	100.00	MDLZ
7	18-25											.521	.087	.010	.010	0.000	.007	.075	.710	GPM ²
8	1-17	20 Jul 1984	12:00	225	415	.7262	875	2	15.98	.17	81.54	1.83	.28	.03	.03	0.00	0.00	.14	100.00	MDLZ
8	18-25											.499	.079	.010	.010	0.000	0.000	.059	.656	GPM ²
9	1-17	24 Jul 1984	13:00	225	318	.7688	847	2	19.63	.32	77.60	1.68	.25	.03	.03	.01	.01	.44	100.00	MDLZ
9	18-25											.458	.070	.010	.010	.004	.004	.185	.740	GPM ²
10	1-17	26 Jul 1984	12:00	267	269	.7887	813	2	22.24	.29	75.30	1.63	.23	.02	.02	.01	0.00	.26	100.00	MDLZ
10	18-25											.444	.065	.007	.005	.004	0.000	.109	.635	GPM ²
11	1-17	12 Oct 1984	11:46	265	314	.7839	827	2	21.47	.17	78.00	1.69	.25	.03	.02	0.00	0.00	.37	100.00	MDLZ
11	18-25											.461	.070	.010	.006	0.000	0.000	.155	.703	GPM ²
12	1-17	6 Dec 1984	12:00	238	363	.7806	891	2	17.46	.19	79.29	1.74	.27	.03	.03	.02	.03	.94	100.00	MDLZ
12	18-25											.474	.076	.010	.010	.007	.011	.394	.983	GPM ²

* TIME OF 12:00 WAS ENTERED IF CORRECT TIME WAS NOT KNOWN.

IGM2DFAGBASI

* DRY GAS AT 14.73 PSIA AND 60 DEG F. (ASTM D 3586-77). GPM's ARE FOR GAS AT 15.025 PSIA.

* LAB 1 IS INSTITUTE OF GAS TECHNOLOGY; LAB 2 IS WEATHERLY LABORATORIES, INC.; LAB 3 IS PETROLEUM ANALYST INC.

THIS IS CHOICE 7.

THIS GAS CAME FROM THE DRAGER SAMPLING POINT WHICH IS CONNECTED TO THE TOP OF THE SECOND STAGE SEPARATOR AT THE GLADYS McCALL WELL.

RECORD NO.	NUMBERS IN RECORD	DATE	TIME	TEMP, F	PRESS, PSIA	GRAVITY ² AIR=1	GROSS HEATING ² VALUE, BTU/CF	LAB ³ NO.	CO2	N2	C1	C2	C3	iC4	nC4	iC5	nC5	C6+	TOTAL
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13	1-17	28 Feb 1985	12:00	245	365	.7493	854	2	18.25	.18	79.26	1.78	.27	.03	.03	0.00	0.00	.20	100.00
13	18-25											.485	.076	.010	.010	0.000	0.000	.084	.665
																			6PM ²
14	1-17	17 Dec 1985	17:20	270	430	.7260	875	1	16.00	.17	81.55	1.81	.28	.03	.03	0.00	0.00	.13	100.00
14	18-25											.493	.079	.010	.010	0.000	0.000	.055	.646
																			6PM ²
15	1-17	18 Dec 1985	09:44	270	435	.7264	875	1	16.04	.10	81.57	1.81	.27	.03	.03	0.00	.02	.13	100.00
15	18-25											.493	.076	.010	.010	0.000	.007	.055	.651
																			6PM ²
16	1-17	15 Jan 1986	08:15	245	356	.7365	862	1	17.10	.27	80.45	1.68	.34	.02	.02	0.00	0.00	.12	100.00
16	18-25											.458	.095	.007	.006	0.000	0.000	.050	.617
																			6PM ²
17	1-17	10 Feb 1986	16:30	293	268	.7758	823	1	21.18	.11	76.64	1.60	.23	.02	.02	.01	0.00	.19	100.00
17	18-25											.436	.065	.007	.006	.004	0.000	.080	.597
																			6PM ²
18	1-17	11 Feb 1986	10:22	303	323	.7548	844	1	19.02	.15	78.66	1.71	.26	.03	.03	0.00	0.00	.14	100.00
18	18-25											.466	.073	.010	.010	0.000	0.000	.059	.618
																			6PM ²
19	1-17	12 Feb 1986	12:05	295	329	.7483	848	1	18.44	.17	79.28	1.70	.24	.03	.02	0.00	0.00	.12	100.00
19	18-25											.463	.067	.010	.006	0.000	0.000	.050	.598
																			6PM ²
20	1-17	19 Feb 1987	09:40	280	285	.7694	828	1	20.52	.16	77.22	1.64	.24	.02	.02	.01	0.00	.17	100.00
20	18-25											.447	.067	.007	.006	.004	0.000	.071	.603
																			6PM ²
21	1-17	13 Apr 1987	09:30	276	415	.7310	864	1	16.71	.22	80.90	1.81	.26	.02	.01	0.00	0.00	.07	100.00
21	18-25											.493	.073	.007	.003	0.000	0.000	.029	.606
																			6PM ²
22	1-17	13 Apr 1987	16:30	260	409	.7029	899	1	13.60	.18	83.73	2.01	.35	.04	.02	.01	0.00	.05	100.00
22	18-25											.548	.098	.013	.010	.004	0.000	.021	.694
																			6PM ²
23	1-17	13 Apr 1987	17:40	250	410	.7065	897	1	12.89	.19	83.35	2.06	.36	.04	.04	0.00	0.00	.07	100.00
23	18-25											.562	.101	.013	.013	0.000	0.000	.029	.718
																			6PM ²
24	1-17	14 Apr 1987	06:50	270	420	.7019	905	1	13.30	.21	83.84	2.08	.38	.04	.05	.01	.01	.08	100.00
24	18-25											.567	.107	.013	.016	.004	.004	.034	.744
																			6PM ²

¹ TIME OF 12:00 WAS ENTERED IF CORRECT TIME WAS NOT KNOWN.

(CM2CRAGBAS)

² DRY GAS AT 14.73 PSIA AND 60 DEG F. (ASTM D 3588-77). GPM's ARE FOR GAS AT 15.025 PSIA.

³ LAB 1 IS INSTITUTE OF GAS TECHNOLOGY; LAB 2 IS WEATHERLY LABORATORIES, INC.; LAB 3 IS PETROLEUM ANALYST INC.

THIS IS CHOICE 7.

THIS GAS CAME FROM THE DRAGER SAMPLING POINT WHICH IS CONNECTED TO THE TOP OF THE SECOND STAGE SEPARATOR AT THE GLADYS McCALL WELL.

RECORD NO.	NUMBERS IN RECORD	DATE	TIME*	TEMP, F	PRESS, PSIA	GRAVITY* AIR=1	GROSS HEATING* VALUE, BTU/CF	LAB* NO.	CO2	N2	C1	C2	C3	IC4	nC4	IC5	nC5	C6+	TOTAL	
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25	1-17	14 Apr 1987	06:30	280	420	.7036	904	1	13.43	.19	83.71	2.08	.38	.05	.05	.01	0.00	.10	100.00	MOL%
25	18-25											.567	.107	.017	.016	.004	0.000	.042	.752	GPM*
26	1-17	14 Apr 1987	14:00	270	442	.7036	904	1	13.44	.19	83.66	2.13	.39	.04	.04	.01	.01	.09	100.00	MOL%
26	18-25											.581	.109	.013	.013	.004	.004	.038	.762	GPM*
27	1-17	14 Apr 1987	21:00	280	449	.6967	912	1	12.70	.20	84.35	2.15	.41	.05	.05	0.00	0.00	.09	100.00	MOL%
27	18-25											.586	.115	.017	.016	0.000	0.000	.038	.772	GPM*
28	1-17	20 Apr 1987	17:20	260	450	.7198	881	1	15.38	.17	82.16	1.84	.30	.03	.03	.03	0.00	.08	100.02	MOL%
28	18-25											.502	.084	.010	.010	.011	0.000	.034	.650	GPM*
29	1-17	27 Apr 1987	10:14	274	463	.7193	879	1	15.41	.17	82.15	1.86	.28	.02	.02	0.00	0.00	.09	100.00	MOL%
29	18-25											.507	.079	.007	.006	0.000	0.000	.038	.637	GPM*

* TIME OF 12:00 WAS ENTERED IF CORRECT TIME WAS NOT KNOWN.

[EMZDRAGBAS]

* DRY GAS AT 14.73 PSIA AND 60 DEG F. (ASTM D 3588-77). GPM's ARE FOR GAS AT 15.025 PSIA.

* LAB 1 IS INSTITUTE OF GAS TECHNOLOGY; LAB 2 IS WEATHERLY LABORATORIES, INC.; LAB 3 IS PETROLEUM ANALYST INC.

THIS IS CHOICE B.

THIS GAS WAS RELEASED WHEN THE PRESS. ON GLADYS McCALL SECOND STAGE SEPARATOR BRINE WAS REDUCED TO ONE ATMOSPHERE.

RECORD NO.	NUMBERS IN RECORD	DATE	TIME	TEMP, F	PRESS, PSIA	GRAVITY ² AIR=1	GROSS HEATING ² VALUE, BTU/CF	LAB ³ NO.	CO2	N2	C1	C2	C3	iC4	nC4	iC5	nC5	C6+	TOTAL	
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1	1-17	14 Jan 1984	16:00	226	320	.9800	600	2	42.66	0.00	55.89	1.09	.12	.01	.01	.02	.04	.16	100.00	MOL%
1	18-25											.297	.034	.003	.003	.007	.015	.067	.427	GPM ²
2	1-17	24 Jan 1984	12:00	267	515	.9540	621	2	40.25	0.00	58.41	1.10	.11	.01	.01	.02	0.00	.09	100.00	MOL%
2	18-25											.300	.031	.003	.003	.007	0.000	.038	.383	GPM ²
3	1-17	26 Jan 1984	12:00	276	425	.9455	629	2	39.40	0.00	59.29	1.09	.10	.01	.01	0.00	0.00	.10	100.00	MOL%
3	18-25											.297	.028	.003	.003	0.000	0.000	.042	.374	GPM ²
4	1-17	27 Jan 1984	12:00	267	319	1.0070	565	2	45.73	0.00	53.03	1.00	.10	.01	.01	0.00	0.00	.12	100.00	MOL%
4	18-25											.273	.028	.003	.003	0.000	0.000	.050	.358	GPM ²
5	1-17	7 Feb 1984	12:30	275	418	.9861	582	2	43.76	0.00	55.11	.96	.09	.01	.01	0.00	0.00	.06	100.00	MOL%
5	18-25											.262	.025	.003	.003	0.000	0.000	.025	.319	GPM ²
6	1-17	9 Feb 1984	12:00	272	315	.9923	580	2	44.25	0.00	54.52	1.00	.10	.01	.01	0.00	0.00	.11	100.00	MOL%
6	18-25											.273	.026	.003	.003	0.000	0.000	.046	.353	GPM ²
7	1-17	18 Jul 1984	12:00	223	515	.9600	612	2	40.95	0.00	57.81	1.03	.10	.01	.01	0.00	0.00	.09	100.00	MOL%
7	18-25											.281	.028	.003	.003	0.000	0.000	.038	.353	GPM ²
8	1-17	20 Jul 1984	12:00	225	415	.9782	596	2	42.74	0.00	55.94	1.08	.11	.01	.01	0.00	0.00	.11	100.00	MOL%
8	18-25											.294	.031	.003	.003	0.000	0.000	.046	.376	GPM ²
9	1-17	24 Jul 1984	12:00	225	318	.9948	575	2	44.60	0.00	54.21	.99	.11	.01	.01	0.00	0.00	.07	100.00	MOL%
9	18-25											.270	.031	.003	.003	0.000	0.000	.029	.337	GPM ²
10	1-17	26 Jul 1984	12:00	267	269	1.0158	559	2	46.50	0.00	52.31	.88	.08	.01	.01	.01	0.00	.20	100.00	MOL%
10	18-25											.240	.022	.003	.003	.004	0.000	.084	.357	GPM ²
11	1-17	17 Dec 1985	22:15	273	430	.8170	764	1	26.11	0.00	72.38	1.30	.13	.01	.01	0.00	0.00	.06	100.00	MOL%
11	18-25											.354	.036	.003	.003	0.000	0.000	.025	.423	GPM ²
12	1-17	18 Dec 1985	09:15	274	435	.8895	688	1	33.59	0.00	65.01	1.17	.12	.01	.01	0.00	0.00	.09	100.00	MOL%
12	18-25											.319	.034	.003	.003	0.000	0.000	.038	.397	GPM ²

¹ TIME OF 12:00 WAS ENTERED IF CORRECT TIME WAS NOT KNOWN.

[GMZFLSHGAS]

² DRY GAS AT 14.73 PSIA AND 60 DEG F. (ASTM D 3588-77). GPM's ARE FOR GAS AT 15.025 PSIA.

³ LAB 1 IS INSTITUTE OF GAS TECHNOLOGY; LAB 2 IS WEATHERLY LABORATORIES, INC.; LAB 3 IS PETROLEUM ANALYST INC.

THIS IS CHOICE B.

THIS GAS WAS RELEASED WHEN THE PRESS. ON GLADYS McCALL SECOND STAGE SEPARATOR BRINE WAS REDUCED TO ONE ATMOSPHERE.

RECORD NO.	NUMBERS IN RECORD	DATE	TIME ¹	TEMP, F	PRESS, PSIA	GRAVITY ² AIR=1	GROSS HEATING ³ VALUE, BTU/CF	LAB ³ NO.	CO2	N2	C1	C2	C3	iC4	nC4	iC5	nC5	C6+	TOTAL
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13	1-17	15 Jan 1986	09:30	245	356	.9162	661	1	36.33	0.00	62.37	1.06	.10	0.00	.01	0.00	0.00	.13	100.00
13	18-25											.289	.028	0.000	.003	0.000	0.000	.055	.375
14	1-17	19 Feb 1987	11:00	280	285	.9268	637	1	37.39	.81	60.25	1.05	.10	.01	0.00	0.00	0.00	.08	99.69
14	18-25											.286	.028	.003	0.000	0.000	0.000	.034	.351
15	1-17	13 Apr 1987	10:50	276	416	.9444	622	1	38.97	.97	58.81	1.06	.10	.01	.01	0.00	0.00	.07	100.00
15	18-25											.289	.028	.003	.003	0.000	0.000	.029	.353
16	1-17	13 Apr 1987	19:00	253	418	.8937	679	1	33.59	.96	63.95	1.26	.15	.01	.01	0.00	0.00	.07	100.00
16	18-25											.344	.042	.003	.003	0.000	0.000	.029	.422
17	1-17	14 Apr 1987	09:00	280	420	.8864	689	1	32.70	1.03	64.68	1.31	.16	.01	.01	0.00	0.00	.10	100.00
17	18-25											.357	.045	.003	.003	0.000	0.000	.042	.451
18	1-17	14 Apr 1987	16:00	275	445	.8447	735	1	28.56	.61	69.12	1.43	.18	.01	.03	0.00	0.00	.06	100.00
18	18-25											.390	.051	.003	.010	0.000	0.000	.025	.479
19	1-17	14 Apr 1987	21:15	280	449	.8301	749	1	27.01	.78	70.52	1.43	.18	.01	.01	0.00	0.00	.06	100.00
19	18-25											.390	.051	.003	.003	0.000	0.000	.025	.472
20	1-17	27 Apr 1987	10:00	274	463	.9351	632	1	38.17	.70	59.88	1.08	.11	.01	0.00	0.00	0.00	.05	100.00
20	18-25											.294	.031	.003	0.000	0.000	0.000	.021	.350

¹ TIME OF 12:00 WAS ENTERED IF CORRECT TIME WAS NOT KNOWN.

[BM2FLSHGAS]

² DRY GAS AT 14.73 PSIA AND 60 DEG F. (ASTM D 3588-77). GPM's ARE FOR GAS AT 15.025 PSIA.

³ LAB 1 IS INSTITUTE OF GAS TECHNOLOGY; LAB 2 IS WEATHERLY LABORATORIES, INC.; LAB 3 IS PETROLEUM ANALYST INC.

THIS IS CHOICE 9.

THIS GAS WAS COLLECTED ON THE GLADYS McALL SITE, AFTER THE GLYCOL UNIT. IT IS COMINGLED FIRST AND SECOND STAGE GAS, READY FOR SALES.

RECORD NO.	NUMBERS IN RECORD	DATE	TIME*	TEMP, F	PRESS, PSIA	GRAVITY* AIR=1	GROSS HEATING* VALUE, BTU/CF	LAB* NO.	CO2	N2	O1	O2	O3	IC4	IC4	IC5	IC5	IC6+	TOTAL	
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1	1-17	12 Oct 1984	12:42	98	1015	.6748	941	2	10.15	.26	86.52	2.32	.50	.03	.07	.02	.01	.07	100.00	MOL%
1	18-25											.633	.140	.027	.022	.007	.004	.029	.863	GFMP
2	1-17	28 Feb 1985	12:00	67	1024	.6676	955	2	9.15	.27	87.32	2.39	.54	.10	.08	.02	.02	.11	100.00	MOL%
2	18-25											.652	.152	.033	.026	.007	.007	.046	.923	GFMP
3	1-17	28 Feb 1985	12:00	62	995	.6677	956	2	9.10	.26	87.36	2.39	.53	.09	.09	.02	.01	.15	100.00	MOL%
3	18-25											.652	.149	.030	.029	.007	.004	.063	.933	GFMP
4	1-17	15 Jan 1986	08:55	79	1019	.6610	952	1	8.93	.14	87.95	2.29	.51	.08	.06	0.00	0.00	.04	100.00	MOL%
4	18-25											.624	.143	.027	.019	0.000	0.000	.017	.830	GFMP
5	1-17	10 Feb 1986	16:15	54	1015	.6713	941	1	9.96	.21	86.86	2.26	.49	.08	.07	.01	0.00	.04	100.00	MOL%
5	18-25											.616	.138	.027	.022	.004	0.000	.017	.823	GFMP
6	1-17	11 Feb 1986	09:50	65	1019	.6672	947	1	9.45	.23	87.31	2.29	.49	.08	.07	.02	.01	.05	100.00	MOL%
6	18-25											.624	.138	.027	.022	.007	.004	.021	.845	GFMP
7	1-17	11 Feb 1986	23:33	62	1020	.6669	949	1	9.36	.24	87.54	2.31	.51	.08	.07	.02	.01	.06	100.00	MOL%
7	18-25											.630	.143	.027	.022	.007	.004	.025	.856	GFMP
8	1-17	12 Feb 1986	10:55	72	1040	.6675	947	1	9.49	.23	87.26	2.31	.49	.08	.07	.01	0.00	.06	100.00	MOL%
8	18-25											.630	.138	.027	.022	.004	0.000	.025	.845	GFMP
9	1-17	19 Feb 1987	09:15	69	985	.6710	942	1	9.88	.24	86.91	2.28	.48	.07	.06	.02	.01	.05	100.00	MOL%
9	18-25											.622	.135	.023	.019	.007	.004	.021	.831	GFMP
10	1-17	19 Feb 1987	11:10	72	990	.6703	943	1	9.81	.25	86.94	2.29	.50	.07	.05	.02	.01	.04	99.99	MOL%
10	18-25											.624	.140	.022	.019	.007	.004	.017	.835	GFMP
11	1-17	13 Apr 1987	10:15	66	1005	.6629	948	1	9.14	.23	87.64	2.34	.49	.07	.07	0.00	.01	.01	100.00	MOL%
11	18-25											.636	.138	.023	.022	0.000	.004	.004	.829	GFMP
12	1-17	27 Apr 1987	11:35	92	1010	.6609	951	1	8.91	.23	87.85	2.35	.50	.07	.05	.02	.01	.01	100.00	MOL%
12	18-25											.641	.140	.023	.016	.007	.004	.004	.836	GFMP

* TIME OF 12:00 WAS ENTERED IF CORRECT TIME WAS NOT KNOWN.

(CMSALEB86)

* DRY GAS AT 14.73 PSIA AND 60 DEG F. (ASTM D 3585-77). GFMP'S ARE FOR GAS AT 15.000 PSIA.

* LAB 1 IS INSTITUTE OF GAS TECHNOLOGY; LAB 2 IS WEATHERLY LABORATORIES, INC.; LAB 3 IS PETROLEUM ANALYST INC.

THIS IS CHOICE 10.
THIS GAS CAME FROM THE LOUISIANA RESOURCES METER STATION NEAR HIGHWAY 82 AT THE GLADYS McDALL WELL.

RECORD NO.	NUMBERS IN RECORD	DATE	TIME ¹	TEMP F	PRESS, PSIA	DENSITY ² AIR=1	GROSS HEATING ² VALUE, BTU/CF	LAB ³ NO.	CO2	N2	O1	O2	O3	IC4	nC4	IC5	nC5	C6+	TOTAL	
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1	1-17	25 Jul 1984	12:00	85	825	.6597	951	3	8.42	.25	88.10	2.38	.56	.09	.03	.02	.01	.03	100.00	MOL%
1	18-25											.649	.157	.030	.026	.007	.004	.038	.911	GPMP
2	1-17	21 Dec 1984	12:00	68	170	.6689	943	3	9.64	.36	87.02	2.27	.52	.08	.07	.01	0.00	.03	100.00	MOL%
2	18-25											.619	.146	.027	.022	.004	0.000	.012	.830	GPMP
3	1-17	22 Jan 1985	12:00	0	235	.6719	950	3	9.62	.25	87.02	2.23	.53	.09	.07	.02	.01	.16	100.00	MOL%
3	18-25											.606	.149	.030	.022	.007	.004	.067	.857	GPMP
4	1-17	22 Jan 1985	12:00	30	975	.6715	949	3	9.60	.27	86.92	2.40	.49	.09	.07	.02	.01	.13	100.00	MOL%
4	18-25											.654	.138	.030	.022	.007	.004	.055	.910	GPMP
5	1-17	21 Feb 1985	12:00	67	970	.6687	946	3	9.56	.25	87.18	2.24	.53	.09	.07	.02	.01	.05	100.00	MOL%
5	18-25											.611	.149	.030	.022	.007	.004	.021	.844	GPMP
6	1-17	21 Feb 1985	12:00	0	210	.6727	954	3	9.50	.26	87.01	2.25	.54	.10	.08	.06	.02	.18	100.00	MOL%
6	18-25											.613	.152	.033	.026	.022	.007	.075	.929	GPMP
7	1-17	22 Mar 1985	12:00	65	960	.6764	938	3	10.39	.25	86.42	2.17	.52	.09	.08	.02	.01	.05	100.00	MOL%
7	18-25											.592	.146	.030	.025	.007	.004	.021	.825	GPMP
8	1-17	22 Mar 1985	12:00	0	205	.6691	943	3	9.71	.24	87.14	2.18	.52	.08	.07	.01	.01	.04	100.00	MOL%
8	18-25											.594	.146	.027	.022	.004	.004	.017	.814	GPMP
9	1-17	22 Apr 1985	12:00	72	235	.6658	949	3	9.33	.20	87.46	2.25	.53	.10	.08	.02	.01	.02	100.00	MOL%
9	18-25											.613	.149	.033	.026	.007	.004	.006	.841	GPMP
10	1-17	22 Apr 1985	12:00	72	965	.6695	951	3	9.44	.26	87.08	2.36	.55	.09	.08	.02	.01	.09	100.00	MOL%
10	18-25											.649	.154	.030	.026	.007	.004	.038	.906	GPMP
11	1-17	23 May 1985	12:00	0	0	.6790	935	3	10.64	.25	86.11	2.25	.51	.09	.07	.01	.01	.05	100.00	MOL%
11	18-25											.613	.143	.030	.022	.004	.004	.025	.842	GPMP
12	1-17	28 May 1985	12:00	78	970	.6790	935	3	10.64	.25	86.13	2.24	.50	.08	.07	.01	.01	.07	100.00	MOL%
12	18-25											.611	.140	.027	.022	.004	.004	.029	.837	GPMP

¹ TIME OF 12:00 WAS ENTERED IF CORRECT TIME WAS NOT KNOWN.

(GM_LABALE)

² DRY GAS AT 14.73 PSIA AND 60 DEG F. (ASTM D 3596-77). GPM's ARE FOR GAS AT 15.025 PSIA.

³ LAB 1 IS INSTITUTE OF GAS TECHNOLOGY; LAB 2 IS WEATHERLY LABORATORIES, INC.; LAB 3 IS PETROLEUM ANALYST INC.

THIS IS CHOICE 10.
THIS GAS CAME FROM THE LOUISIANA RESOURCES METER STATION NEAR HIGHWAY 62 AT THE BLADYS McCALL WELL.

RECORD NO.	NUMBERS IN RECORD	DATE	TIME ¹	TEMP, F	PRESS. PSIA	GRAVITY ² AIR=1	GROSS HEATING ² VALUE, BTU/CF	LAB ³ NO.	CO2	N2	O1	O2	O3	1C4	nC4	1C5	nC5	C6+	TOTAL
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13	1-17	21 Jun 1985	12:00	78	210	.6717	940	3	10.00	.25	86.61	2.25	.50	.08	.06	.01	.01	.03	100.00
13	18-25											.610	.140	.027	.019	.004	.004	.013	.820
14	1-17	21 Jun 1985	12:00	78	965	.6753	938	3	9.94	.82	86.23	2.24	.50	.08	.07	.01	.01	.10	100.00
14	18-25											.611	.140	.027	.022	.004	.004	.042	.350
15	1-17	21 Jun 1985	12:00	78	965	.6753	938	3	9.94	.82	86.23	2.24	.50	.08	.07	.01	.01	.10	100.00
15	18-25											.611	.140	.027	.022	.004	.004	.042	.850
16	1-17	19 Jul 1985	12:00	78	965	.6770	942	3	10.27	.24	86.40	2.28	.51	.08	.07	.02	.01	.12	100.00
16	18-25											.622	.140	.027	.022	.007	.004	.050	.875
17	1-17	19 Jul 1985	12:00	78	205	.6758	938	3	10.34	.25	86.42	2.27	.50	.08	.06	.01	.01	.06	100.00
17	18-25											.619	.140	.027	.019	.004	.004	.025	.838
18	1-17	22 Aug 1985	12:00	87	225	.6736	947	2	9.81	.29	86.66	2.38	.55	.10	.08	.02	.01	.10	100.00
18	18-25											.649	.154	.030	.026	.007	.004	.042	.915
19	1-17	25 Sep 1985	12:00	83	990	.6783	947	2	10.11	.30	86.35	2.32	.52	.09	.08	.02	.01	.20	100.00
19	18-25											.633	.146	.030	.026	.007	.004	.064	.929
20	1-17	26 Oct 1985	12:00	85	985	.6754	945	2	10.00	.29	86.55	2.32	.52	.08	.07	.02	.01	.14	100.00
20	18-25											.633	.146	.027	.022	.007	.004	.059	.898
21	1-17	21 Nov 1985	12:00	0	965	.6482	971	2	7.33	.26	89.22	2.41	.53	.09	.07	.02	.01	.06	100.00
21	18-25											.657	.149	.030	.022	.007	.004	.025	.695
22	1-17	21 Nov 1985	12:00	0	200	.6720	943	3	9.90	.25	86.84	2.26	.51	.08	.07	.01	.01	.07	100.00
22	18-25											.616	.143	.027	.022	.004	.004	.029	.845
23	1-17	23 Dec 1985	12:00	0	975	.6614	957	2	8.67	.26	87.67	2.39	.52	.09	.07	.02	.01	.08	100.00
23	18-25											.652	.146	.030	.022	.007	.004	.034	.395
24	1-17	24 Jan 1986	12:00	63	205	.6587	947	3	9.51	.27	87.18	2.29	.50	.08	.06	.01	.01	.09	100.00
24	18-25											.624	.140	.027	.019	.004	.004	.038	.856

¹ TIME OF 12:00 WAS ENTERED IF CORRECT TIME WAS NOT KNOWN.

(SM,LA,SALE)

² DRY GAS AT 14.73 PSIA AND 60 DEG F. (ASTM D 3589-77). GPM's ARE FOR GAS AT 15.025 PSIA.

³ LAB 1 IS INSTITUTE OF GAS TECHNOLOGY; LAB 2 IS WEATHERLY LABORATORIES, INC.; LAB 3 IS PETROLEUM ANALYST INC.

THIS IS CHOICE 10.
THIS GAS CAME FROM THE LOUISIANA RESOURCES METER STATION NEAR HIGHWAY 52 AT THE GLADYS McDALL WELL.

RECORD NO.	NUMBERS IN RECORD	DATE	TIME ¹	TEMP. F	PRESS. PSIA	GRAVITY ² AIR=1	GROSS HEATING ² VALUE, BTU/CF	LAB ³ NO.	CO2	N2	O1	O2	O3	104	104	105	105	106	TOTAL
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25	1-17	12 Feb 1986	10:46	72	1052	.6677	949	1	9.41	.23	87.28	2.32	.50	.08	.07	.00	.01	.07	100.00
25	18-25											.633	.140	.027	.022	.011	.004	.029	.866
26	1-17	24 Mar 1986	12:00	66	195	.6708	946	3	9.72	.26	86.98	2.28	.50	.08	.07	.01	.01	.09	100.00
26	18-25											.622	.140	.027	.022	.004	.004	.038	.856
27	1-17	19 Jun 1986	12:00	81	985	.6731	941	3	10.02	.27	86.74	2.24	.46	.08	.07	.01	.01	.08	100.00
27	18-25											.611	.135	.027	.022	.004	.004	.034	.836
28	1-17	21 Aug 1986	12:00	84	995	.6705	945	3	9.72	.28	87.00	2.26	.49	.08	.06	.01	.01	.09	100.00
28	18-25											.616	.138	.027	.019	.004	.004	.036	.845
29	1-17	21 Nov 1986	12:00	70	900	.6680	949	3	9.45	.23	87.31	2.26	.49	.07	.06	.01	.01	.11	100.00
29	18-25											.616	.138	.023	.019	.004	.004	.046	.850
30	1-17	17 Dec 1986	12:00	59	1030	.6637	946	3	9.42	.29	87.22	2.27	.53	.07	.06	.01	.01	.12	100.00
30	18-25											.619	.149	.023	.019	.004	.004	.050	.868
31	1-17	16 Jan 1987	12:00	51	1025	.6688	947	3	9.56	.23	87.15	2.27	.51	.07	.06	.01	.01	.09	100.00
31	18-25											.619	.143	.023	.019	.004	.004	.038	.850
32	1-17	23 Feb 1987	12:00	60	650	.6725	941	3	10.02	.24	86.78	2.23	.50	.07	.06	.01	.01	.08	100.00
32	18-25											.608	.140	.023	.019	.004	.004	.074	.832
33	1-17	21 Apr 1987	12:00	90	750	.6697	947	3	9.62	.24	87.14	2.25	.47	.07	.06	.01	.01	.11	100.00
33	18-25											.613	.138	.027	.019	.004	.004	.046	.847

¹ TIME OF 12:00 WAS ENTERED IF CORRECT TIME WAS NOT KNOWN.

164 LA SALE

² DRY GAS AT 14.73 PSIA AND 60 DEG F. (ASTM D 3586-77). GPM's ARE FOR GAS AT 15.025 PSIA.

³ LAB 1 IS INSTITUTE OF GAS TECHNOLOGY; LAB 2 IS WEATHERLY LABORATORIES, INC.; LAB 3 IS PETROLEUM ANALYST INC.

APPENDIX C

Compilation of "Total Gas" Analyses

THIS IS FILE GMBASANAL ON DISK GMBAS. IT WAS CREATED USING PROGRAM 'GMBASANAL' ON GMBAS. EACH DATE AND TIME ARE IN ONE NUMBER. WEATHERLY TIMES ARE QUESTIONABLE. NEG. NOS. AND '12:00' INDICATE DATA IS NOT AVAILABLE. LAB 1 IS 1ST AND LAB 2 IS WEATHERLY.

	RECORD NO.	NUMBERS IN RECORD	DATE	TIME	TEMP	PRESS PSIA	BWR GCF/bbl	CO2	N2	O1	O2	O3	O4	NO4	O5	NO5	O++	LAB	O2/O1	O3/O1	O5/O1
	---	-----	-----	-----	---	----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
FIRST STAGE	1	1-15	8 Oct 1983	12:00	97	515	26.50	10.63	.25	85.96	2.34	.52	.09	.07	.02	.01	.11	2			
SECOND STAGE	1	16-30	8 Oct 1983	12:00	-0	-0	0.00	-.10	-.10	-.10	-.10	-.10	-.10	-.10	-.10	-.10	-.10	2			
FLASHED GAS	1	31-45	8 Oct 1983	12:00	97	515	3.75	39.89	0.00	57.73	1.39	.19	.02	.02	0.00	0.00	.76	2			
TOTAL GAS	1	46-60					30.25	14.26	.22	82.45	2.22	.48	.08	.06	.02	.01	.19	2	.0269	.0055	.1729
FIRST STAGE	2	1-15	28 Oct 1983	12:00	275	515	26.50	10.31	.24	84.85	2.31	.51	.09	.08	.02	.01	1.58	2			
SECOND STAGE	2	16-30	28 Oct 1983	12:00	-0	-0	0.00	-.10	-.10	0.00	-.10	-.10	-.10	-.10	-.10	-.10	-.20	2			
FLASHED GAS	2	31-45	28 Oct 1983	12:00	275	515	3.95	40.74	0.00	57.21	1.35	.19	.02	.02	0.00	0.00	.47	2			
TOTAL GAS	2	46-60					30.35	14.17	.21	81.34	2.19	.47	.08	.07	.02	.01	1.44	2	.0269	.0053	.1742
FIRST STAGE	3	1-15	14 Jan 1984	17:00	227	769	24.96	9.09	.25	87.14	2.41	.55	.10	.08	.02	.01	.35	2			
SECOND STAGE	3	16-30	14 Jan 1984	16:00	226	320	3.05	18.69	.16	76.33	1.81	.28	.03	.03	.03	.01	.43	2			
FLASHED GAS	3	31-45	14 Jan 1984	16:00	226	320	2.33	42.66	0.00	55.89	1.09	.12	.01	.01	.02	.34	.16	2			
TOTAL GAS	3	46-60					30.34	12.65	.22	83.85	2.25	.49	.09	.07	.02	.01	.34	2	.0268	.0059	.1509
FIRST STAGE	4	1-15	18 Jan 1984	14:00	100	765	25.20	6.80	.26	88.76	2.44	.55	.10	.08	.03	.02	.96	2			
SECOND STAGE	4	16-30	18 Jan 1984	14:00	-0	-0	0.00	-.10	-.10	-.10	-.10	-.10	-.10	-.10	-.10	-.10	-.20	2			
FLASHED GAS	4	31-45	18 Jan 1984	14:00	275	765	6.03	32.79	0.00	65.18	1.51	.29	.04	.03	.01	.01	.14	2			
TOTAL GAS	4	46-60					31.23	11.82	.21	84.21	2.26	.50	.09	.07	.03	.02	.80	2	.0268	.0059	.1403
FIRST STAGE	5	1-15	24 Jan 1984	12:00	110	1015	22.90	7.89	.26	88.35	2.48	.57	.10	.09	.02	.01	.23	2			
SECOND STAGE	5	16-30	24 Jan 1984	13:00	220	515	2.49	13.54	.19	83.74	1.94	.31	.04	.03	0.00	0.00	.21	2			
FLASHED GAS	5	31-45	24 Jan 1984	13:00	267	515	4.22	40.25	0.00	58.41	1.10	.11	.01	.01	.02	0.00	.09	2			
TOTAL GAS	5	46-60					29.61	12.98	.22	83.70	2.24	.46	.08	.07	.02	.01	.21	2	.0267	.0058	.1551
FIRST STAGE	6	1-15	26 Jan 1984	12:00	100	1021	22.36	7.81	.26	88.52	2.48	.57	.10	.09	.02	.01	.13	2			
SECOND STAGE	6	16-30	26 Jan 1984	12:00	230	425	3.20	15.73	.19	81.61	1.85	.28	.03	.03	0.00	.01	.28	2			
FLASHED GAS	6	31-45	26 Jan 1984	12:00	275	425	3.19	39.40	0.00	55.29	1.09	.10	.01	.01	0.00	0.00	.10	2			
TOTAL GAS	6	46-60					28.75	12.20	.22	84.51	2.26	.49	.08	.07	.02	.01	.14	2	.0267	.0057	.1445
FIRST STAGE	7	1-15	27 Jan 1984	13:00	245	1016	22.55	7.83	.27	88.51	2.47	.56	.10	.08	.02	.01	.15	2			
SECOND STAGE	7	16-30	27 Jan 1984	13:00	250	319	4.79	18.95	.16	78.55	1.75	.26	.03	.02	.01	0.00	.27	2			
FLASHED GAS	7	31-45	27 Jan 1984	13:00	267	319	2.60	45.73	0.00	53.03	1.00	.10	.01	.01	0.00	0.00	.12	2			
TOTAL GAS	7	46-60					29.94	12.90	.23	83.84	2.23	.47	.08	.06	.02	.01	.17	2	.0266	.0056	.1539
FIRST STAGE	8	1-15	7 Feb 1984	10:30	88	1015	22.80	7.77	.28	88.54	2.47	.56	.10	.08	.02	.01	.17	2			
SECOND STAGE	8	16-30	7 Feb 1984	12:30	166	418	1.68	15.67	.12	81.88	1.78	.28	.03	.03	0.00	0.00	.21	2			
FLASHED GAS	8	31-45	7 Feb 1984	12:30	275	418	3.34	43.76	0.00	55.11	.96	.09	.01	.01	0.00	0.00	.06	2			
TOTAL GAS	8	46-60					27.82	12.57	.24	84.12	2.25	.49	.08	.07	.02	.01	.16	2	.0267	.0058	.1494
FIRST STAGE	9	1-15	9 Feb 1984	10:15	93	1015	22.80	7.29	.27	88.95	2.48	.57	.10	.08	.02	.02	.22	2			
SECOND STAGE	9	16-30	9 Feb 1984	10:00	252	315	4.20	17.26	.18	80.23	1.74	.26	.03	.02	0.00	0.00	.28	2			
FLASHED GAS	9	31-45	9 Feb 1984	10:00	272	315	2.60	44.25	0.00	54.52	1.00	.10	.01	.01	0.00	0.00	.11	2			
TOTAL GAS	9	46-60					29.50	11.95	.23	84.69	2.24	.43	.08	.07	.02	.02	.22	2	.0265	.0057	.1411

THIS IS FILE BMSASANA1 ON DISK BMSAS. IT WAS CREATED USING PROGRAM 'BMSASANA1P' ON BMSAS. EACH DATE AND TIME ARE IN ONE NUMBER. WEATHERLY TIMES ARE QUESTIONABLE.
NEG. NOS. AND '12:00' INDICATE DATA IS NOT AVAILABLE. LAB 1 IS 1ST AND LAB 2 IS WEATHERLY.

	RECORD NO.	NUMBERS IN RECORD	DATE	TIME	TEMP	PRESS PSIA	BWR SCF/bbl	CO2	N2	O1	O2	O3	IC4	nC4	IC5	nC5	C6+	LAB	CO2/C1	O3/C1	CO2/C1
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FIRST STAGE	10	1-15	29 Feb 1984	11:00	88	324	29.30	12.74	.24	83.92	2.25	.49	.08	.07	.02	.01	.18	2			
SECOND STAGE	10	16-30	29 Feb 1984	11:00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2			
FLASHED GAS	10	31-45	29 Feb 1984	11:00	277	324	2.31	30.59	0.00	67.53	1.49	.22	.03	.03	.02	.01	.08	2			
TOTAL GAS	10	46-60					31.61	14.04	.22	82.72	2.19	.47	.08	.07	.02	.01	.17	2	.0265	.0057	.1698
FIRST STAGE	11	1-15	3 Mar 1984	10:00	92	419	28.10	11.61	.24	85.03	2.27	.50	.08	.07	.02	.01	.17	2			
SECOND STAGE	11	16-30	3 Mar 1984	10:00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2			
FLASHED GAS	11	31-45	3 Mar 1984	10:00	277	419	2.62	25.47	0.00	72.58	1.59	.23	.02	.02	0.00	0.00	.09	2			
TOTAL GAS	11	46-60					30.72	12.79	.22	83.97	2.21	.48	.07	.07	.02	.01	.16	2	.0263	.0057	.1523
FIRST STAGE	12	1-15	18 Jul 1984	14:00	97	1015	22.30	7.80	.25	88.59	2.46	.56	.10	.08	.02	.01	.13	2			
SECOND STAGE	12	16-30	18 Jul 1984	14:00	263	515	3.30	13.40	.19	83.93	1.91	.31	.03	.03	0.00	.02	.18	2			
FLASHED GAS	12	31-45	18 Jul 1984	14:00	263	515	4.42	40.95	0.00	57.81	1.03	.10	.01	.01	0.00	0.00	.09	2			
TOTAL GAS	12	46-60					30.02	13.30	.21	83.55	2.19	.46	.08	.06	.01	.01	.13	2	.0262	.0056	.1592
FIRST STAGE	13	1-15	20 Jul 1984	12:00	95	1015	23.10	7.83	.26	88.57	2.46	.56	.10	.08	.02	.01	.11	2			
SECOND STAGE	13	16-30	20 Jul 1984	12:00	225	415	3.60	15.98	.17	81.54	1.83	.28	.03	.03	0.00	0.00	.14	2			
FLASHED GAS	13	31-45	20 Jul 1984	12:00	264	415	3.76	42.74	0.00	55.94	1.06	.11	.01	.01	0.00	0.00	.11	2			
TOTAL GAS	13	46-60					30.46	13.10	.22	83.71	2.22	.47	.08	.07	.02	.01	.11	2	.0265	.0056	.1565
FIRST STAGE	14	1-15	24 Jul 1984	12:00	94	1018	23.00	7.82	.27	86.53	2.46	.56	.10	.08	.02	.01	.15	2			
SECOND STAGE	14	16-30	24 Jul 1984	13:00	225	318	4.80	19.63	.32	77.60	1.68	.25	.03	.03	.01	.01	.44	2			
FLASHED GAS	14	31-45	24 Jul 1984	13:00	275	318	2.80	44.60	0.00	54.21	.99	.11	.01	.01	0.00	0.00	.07	2			
TOTAL GAS	14	46-60					30.60	13.04	.25	83.68	2.20	.47	.08	.07	.02	.01	.19	2	.0263	.0056	.1558
FIRST STAGE	15	1-15	26 Jul 1984	12:00	82	1020	23.40	7.88	.26	86.50	2.46	.56	.10	.08	.02	.01	.13	2			
SECOND STAGE	15	16-30	26 Jul 1984	15:00	267	269	4.67	22.24	.29	75.30	1.63	.23	.02	.02	.01	0.00	.26	2			
FLASHED GAS	15	31-45	26 Jul 1984	15:00	267	269	2.31	46.50	0.00	52.31	.88	.08	.01	.01	0.00	0.00	.20	2			
TOTAL GAS	15	46-60					30.38	13.02	.24	83.72	2.21	.47	.08	.07	.02	.01	.16	2	.0264	.0056	.1556
FIRST STAGE	16	1-15	17 Dec 1985	17:10	91	1019	23.41	7.89	.25	88.60	2.42	.55	.09	.07	.01	.02	.11	1			
SECOND STAGE	16	16-30	17 Dec 1985	17:20	270	429	3.33	16.00	.17	81.56	1.81	.28	.03	.03	0.00	0.00	.13	1			
FLASHED GAS	16	31-45	17 Dec 1985	22:15	273	430	2.85	26.11	0.00	72.39	1.30	.13	.01	.01	0.00	0.00	.06	1			
TOTAL GAS	16	46-60					29.59	10.56	.21	86.25	2.24	.48	.07	.06	.01	.02	.11	1	.0260	.0055	.1224
FIRST STAGE	17	1-15	18 Dec 1985	09:30	90	1018	23.24	8.00	.17	82.59	2.43	.54	.09	.07	.02	.01	.08	1			
SECOND STAGE	17	16-30	18 Dec 1985	09:44	270	435	3.49	16.04	.10	81.57	1.81	.27	.03	.03	0.00	.02	.13	1			
FLASHED GAS	17	31-45	18 Dec 1985	09:15	274	435	2.66	33.59	0.00	65.01	1.17	.12	.01	.01	0.00	0.00	.09	1			
TOTAL GAS	17	46-60					29.39	11.27	.15	85.62	2.24	.47	.08	.06	.02	.01	.09	1	.0262	.0055	.1316
FIRST STAGE	18	1-15	15 Jan 1986	07:00	88	1015	21.70	7.86	.31	86.47	2.44	.61	.09	.08	.02	.01	.11	1			
SECOND STAGE	18	16-30	15 Jan 1986	08:15	245	356	3.00	17.10	.27	80.45	1.65	.34	.02	.02	0.00	0.00	.12	1			
FLASHED GAS	18	31-45	15 Jan 1986	09:30	245	356	2.33	35.33	0.00	62.37	1.06	.10	0.00	.01	0.00	0.00	.13	1			
TOTAL GAS	18	46-60					27.03	11.34	.26	85.33	2.24	.54	.07	.07	.02	.01	.11	1	.0252	.0063	.1329

THIS IS FILE BMBASANA ON DISK BMBAS. IT WAS CREATED USING PROGRAM 'BMBASANA.LP' ON BMBAS. EACH DATE AND TIME ARE IN ONE NUMBER. WEATHERLY TIMES ARE QUESTIONABLE.
NEG. NOS. AND '12:00' INDICATE DATA IS NOT AVAILABLE. LAB 1 IS 1BT AND LAB 2 IS WEATHERLY.

	RECORD NO.	NUMBERS IN RECORD	DATE	TIME	TEMP	FRESS PSIA	GWR SCF/bbl	C02	N2	O1	C2	O3	i04	n04	i05	n05	C6+	LAB	C2/C1	C3/C1	C02/C1
	===	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
FIRST STAGE	19	1-15	8 Feb 1986	08:45	93	1028	23.50	7.39	.23	89.16	2.33	.53	.08	.07	.02	.01	.13	1			
SECOND STAGE	19	16-30	8 Feb 1986	08:45	-0	-0	0.00	-1.10	-1.10	-1.10	-1.10	-1.10	-1.10	-1.10	-1.10	-1.10	-1.10	1			
FLASHED GAS	19	31-45	8 Feb 1986	08:54	260	1028	6.60	28.47	0.00	69.65	1.38	.18	.02	.01	0.00	0.00	.09	1			
TOTAL GAS	19	46-60					30.10	12.01	.18	84.93	2.16	.45	.07	.06	.02	.01	.12	1	.0254	.0053	.1414
FIRST STAGE	20	1-15	8 Feb 1986	12:44	95	1023	22.50	7.79	.23	86.89	2.41	.54	.09	.08	.02	0.00	.15	1			
SECOND STAGE	20	16-30	8 Feb 1986	12:44	-0	-0	0.00	-1.10	-1.10	-1.10	-1.10	-1.10	-1.10	-1.10	-1.10	-1.10	-1.10	1			
FLASHED GAS	20	31-45	8 Feb 1986	12:40	276	1023	7.25	28.99	0.00	69.31	1.38	.18	.02	.02	0.00	0.00	.10	1			
TOTAL GAS	20	46-60					29.75	12.96	.17	83.97	2.16	.45	.07	.07	.02	0.00	.14	1	.0257	.0054	.1543
FIRST STAGE	21	1-15	10 Feb 1986	13:05	280	1015	22.10	7.74	.24	88.64	2.41	.56	.09	.08	.02	.01	.21	1			
SECOND STAGE	21	16-30	10 Feb 1986	13:05	-0	-0	0.00	-1.10	-1.10	-1.10	-1.10	-1.10	-1.10	-1.10	-1.10	-1.10	-1.10	1			
FLASHED GAS	21	31-45	10 Feb 1986	13:25	280	1015	6.58	23.50	0.00	74.67	1.49	.20	.02	.02	.01	0.00	.07	1			
TOTAL GAS	21	46-60					28.68	11.36	.18	85.44	2.20	.48	.07	.07	.02	.01	.18	1	.0257	.0056	.1329
FIRST STAGE	22	1-15	11 Feb 1986	10:31	282	1019	23.50	7.78	.23	88.52	2.42	.56	.09	.07	.02	.01	.30	1			
SECOND STAGE	22	16-30	11 Feb 1986	10:31	-0	-0	0.00	-1.10	-1.10	-1.10	-1.10	-1.10	-1.10	-1.10	-1.10	-1.10	-1.10	1			
FLASHED GAS	22	31-45	11 Feb 1986	10:34	282	1019	7.12	27.98	0.00	70.27	1.40	.19	.02	.02	0.00	0.00	.12	1			
TOTAL GAS	22	46-60					30.62	12.48	.18	84.28	2.18	.47	.07	.06	.02	.01	.26	1	.0259	.0056	.1480
FIRST STAGE	23	1-15	11 Feb 1986	11:11	282	1019	23.10	8.00	.22	88.07	2.54	.63	.12	.10	.03	.01	.28	1			
SECOND STAGE	23	16-30	11 Feb 1986	11:11	-0	-0	0.00	-1.10	-1.10	-1.10	-1.10	-1.10	-1.10	-1.10	-1.10	-1.10	-1.10	1			
FLASHED GAS	23	31-45	11 Feb 1986	11:14	282	1019	6.52	25.98	0.00	72.25	1.43	.19	.02	.02	0.00	0.00	.11	1			
TOTAL GAS	23	46-60					29.62	11.96	.17	84.59	2.30	.53	.10	.08	.02	.01	.24	1	.0271	.0063	.1414
FIRST STAGE	24	1-15	11 Feb 1986	11:32	282	1019	23.20	3.01	.23	86.12	2.46	.61	.11	.10	.04	.01	.31	1			
SECOND STAGE	24	16-30	11 Feb 1986	11:32	-0	-0	0.00	-1.10	-1.10	-1.10	-1.10	-1.10	-1.10	-1.10	-1.10	-1.10	-1.10	1			
FLASHED GAS	24	31-45	11 Feb 1986	11:38	282	1019	7.03	25.87	0.00	72.36	1.43	.19	.02	.02	0.00	0.00	.11	1			
TOTAL GAS	24	46-60					30.23	12.16	.18	84.46	2.22	.51	.09	.06	.03	.01	.26	1	.0263	.0061	.1440
FIRST STAGE	25	1-15	11 Feb 1986	12:21	282	1015	22.70	7.91	.22	86.37	2.48	.60	.11	.09	.03	.01	.18	1			
SECOND STAGE	25	16-30	11 Feb 1986	12:21	-0	-0	0.00	-1.10	-1.10	-1.10	-1.10	-1.10	-1.10	-1.10	-1.10	-1.10	-1.10	1			
FLASHED GAS	25	31-45	11 Feb 1986	12:24	282	1015	6.69	26.04	0.00	72.19	1.45	.19	.02	.02	0.00	0.00	.11	1			
TOTAL GAS	25	46-60					29.39	12.04	.17	84.69	2.24	.51	.09	.07	.02	.01	.16	1	.0265	.0060	.1421
FIRST STAGE	26	1-15	11 Feb 1986	14:25	283	1018	23.10	7.81	.22	86.74	2.40	.54	.09	.07	.02	.01	.10	1			
SECOND STAGE	26	16-30	11 Feb 1986	14:25	-0	-0	0.00	-1.10	-1.10	-1.10	-1.10	-1.10	-1.10	-1.10	-1.10	-1.10	-1.10	1			
FLASHED GAS	26	31-45	11 Feb 1986	14:30	283	1018	6.81	27.31	0.00	70.92	1.41	.20	.02	.02	0.00	0.00	.12	1			
TOTAL GAS	26	46-60					29.91	12.25	.17	84.68	2.17	.46	.07	.06	.02	.01	.10	1	.0257	.0055	.1447
FIRST STAGE	27	1-15	19 Feb 1987	10:15	90	1015	22.86	7.91	.25	88.57	2.40	.53	.06	.07	.02	.02	.15	1			
SECOND STAGE	27	16-30	19 Feb 1987	09:40	280	285	4.44	20.52	.16	77.22	1.64	.24	.02	.02	.01	0.00	.17	1			
FLASHED GAS	27	31-45	19 Feb 1987	11:00	280	285	1.75	37.51	.81	60.44	1.05	.10	.01	0.00	0.00	0.00	.08	1			
TOTAL GAS	27	46-60					29.04	11.62	.27	85.14	2.10	.45	.07	.06	.02	.02	.15	1	.0259	.0054	.1065

THIS IS FILE BMGASANAL ON DISK BMGAS. IT WAS CREATED USING PROGRAM 'BMGASANALP' ON BMGAS. EACH DATE AND TIME ARE IN ONE NUMBER. WEATHERLY TIMES ARE QUESTIONABLE.
NEG. NOS. AND '12:00' INDICATE DATA IS NOT AVAILABLE. LAB 1 IS IGT AND LAB 2 IS WEATHERLY.

	RECORD NO.	NUMBERS IN RECORD	DATE	TIME	TEMP	PRESS PSIA	SWR SCF/bbl	CO2	N2	C1	C2	C3	IC4	nC4	iC5	nC5	C6+	LAB	CO2/C1	C3/C1	CO2/C1
	====	=====	=====	=====	====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
FIRST STAGE	28	1-15	13 Apr 1987	12:30	95	1013	22.32	8.17	.25	88.36	2.44	.54	.08	.07	.02	.01	.06	1			
SECOND STAGE	28	16-30	13 Apr 1987	09:30	276	415	3.34	16.71	.22	80.90	1.81	.26	.02	.01	0.00	0.00	.07	1			
FLASHED GAS	28	31-45	13 Apr 1987	10:50	276	416	3.07	38.97	.97	58.81	1.06	.10	.01	.01	0.00	0.00	.07	1			
TOTAL GAS	28	46-60					26.73	12.45	.32	84.34	2.22	.46	.07	.06	.02	.01	.06	1	.0263	.0055	.1477
FIRST STAGE	29	1-15	13 Apr 1987	18:20	79	515	27.27	11.11	.23	85.69	2.28	.49	.07	.03	.02	.01	.07	1			
SECOND STAGE	29	16-30	13 Apr 1987	17:40	250	410	1.20	13.89	.19	83.35	2.06	.36	.04	.04	0.00	0.00	.07	1			
FLASHED GAS	29	31-45	13 Apr 1987	19:00	253	418	2.91	33.59	.96	63.95	1.26	.15	.01	.01	0.00	0.00	.07	1			
TOTAL GAS	29	46-60					31.38	13.30	.30	83.58	2.18	.45	.06	.03	.02	.01	.07	1	.0260	.0054	.1591
FIRST STAGE	30	1-15	14 Apr 1987	07:25	80	515	27.21	10.87	.22	85.95	2.23	.47	.07	.08	.02	.01	.08	1			
SECOND STAGE	30	16-30	14 Apr 1987	08:30	280	420	1.18	13.43	.19	83.71	2.08	.38	.05	.05	.01	0.00	.10	1			
FLASHED GAS	30	31-45	14 Apr 1987	09:00	280	420	2.88	32.70	1.03	64.68	1.31	.16	.01	.01	0.00	0.00	.10	1			
TOTAL GAS	30	46-60					31.27	12.98	.29	83.91	2.14	.44	.06	.07	.02	.01	.08	1	.0255	.0052	.1547
FIRST STAGE	31	1-15	14 Apr 1987	07:50	280	515	27.21	10.99	.27	85.76	2.26	.47	.07	.06	.03	.02	.07	1			
SECOND STAGE	31	16-30	14 Apr 1987	07:50	0	0	0.00	-1.10	-1.10	-1.10	-1.10	-1.10	-1.10	-1.10	-1.10	-1.10	-1.10	1			
FLASHED GAS	31	31-45	14 Apr 1987	10:30	280	515	4.31	30.46	1.02	66.72	1.45	.21	.02	.02	0.00	0.00	.10	1			
TOTAL GAS	31	46-60					31.52	13.65	.37	83.16	2.15	.43	.06	.05	.03	.02	.07	1	.0258	.0052	.1642
FIRST STAGE	32	1-15	14 Apr 1987	14:50	91	517	27.47	11.17	.23	85.55	2.30	.49	.07	.07	.02	.01	.09	1			
SECOND STAGE	32	16-30	14 Apr 1987	14:50	0	0	0.00	-1.10	-1.10	-1.10	-1.10	-1.10	-1.10	-1.10	-1.10	-1.10	-1.10	1			
FLASHED GAS	32	31-45	14 Apr 1987	15:20	280	516	3.90	28.90	.66	68.58	1.49	.22	.02	.02	0.00	0.00	.11	1			
TOTAL GAS	32	46-60					31.37	13.37	.28	83.44	2.20	.46	.06	.06	.02	.01	.07	1	.0264	.0055	.1603
FIRST STAGE	33	1-15	14 Apr 1987	14:50	91	517	27.47	11.17	.23	85.55	2.30	.49	.07	.07	.02	.01	.09	1			
SECOND STAGE	33	16-30	14 Apr 1987	14:00	270	442	1.07	13.44	.19	83.66	2.13	.39	.04	.04	.01	.01	.09	1			
FLASHED GAS	33	31-45	14 Apr 1987	16:00	275	445	2.82	28.56	.61	69.12	1.43	.18	.01	.03	0.00	0.00	.06	1			
TOTAL GAS	33	46-60					31.36	12.81	.26	84.01	2.22	.46	.06	.07	.02	.01	.09	1	.0254	.0053	.1525
FIRST STAGE	34	1-15	14 Apr 1987	22:00	85	519	27.73	11.01	.25	85.75	2.27	.48	.07	.06	.02	.02	.07	1			
SECOND STAGE	34	16-30	14 Apr 1987	22:00	0	0	0.00	-1.10	-1.10	-1.10	-1.10	-1.10	-1.10	-1.10	-1.10	-1.10	-1.10	1			
FLASHED GAS	34	31-45	14 Apr 1987	22:30	285	519	3.48	28.36	.50	69.36	1.46	.20	.02	.02	0.00	0.00	.08	1			
TOTAL GAS	34	46-60					31.21	12.94	.28	83.92	2.18	.45	.06	.06	.02	.02	.07	1	.0260	.0053	.1542
FIRST STAGE	35	1-15	14 Apr 1987	22:00	85	519	27.73	11.01	.25	85.75	2.27	.48	.07	.06	.02	.02	.07	1			
SECOND STAGE	35	16-30	14 Apr 1987	21:00	290	449	1.02	12.70	.20	84.35	2.15	.41	.05	.05	0.00	0.00	.09	1			
FLASHED GAS	35	31-45	14 Apr 1987	21:15	280	449	2.70	27.01	.78	70.52	1.43	.18	.01	.01	0.00	0.00	.06	1			
TOTAL GAS	35	46-60					31.45	12.44	.29	84.40	2.19	.45	.06	.06	.02	.02	.07	1	.0260	.0054	.1474
FIRST STAGE	36	1-15	15 Apr 1987	06:25	73	515	27.68	11.09	.22	85.70	2.29	.49	.07	.06	0.00	0.00	.08	1			
SECOND STAGE	36	16-30	15 Apr 1987	06:25	0	0	0.00	-1.10	-1.10	-1.10	-1.10	-1.10	-1.10	-1.10	-1.10	-1.10	-1.10	1			
FLASHED GAS	36	31-45	15 Apr 1987	07:10	285	515	3.53	29.34	.70	68.20	1.43	.19	.02	.02	0.00	0.00	.10	1			
TOTAL GAS	36	46-60					31.21	13.15	.27	83.72	2.19	.46	.06	.06	0.00	0.00	.08	1	.0262	.0054	.1571